

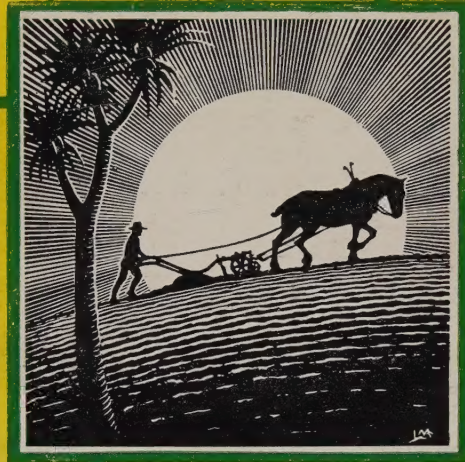
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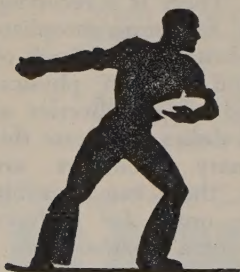


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Nitrogenous Fertilisers

Sources of Local Supplies

THE addition of nitrogen in either organic or inorganic form to phosphatic fertilisers for the grassland and cropping areas of the Dominion has become a standard practice in the progressive and high production districts. In view of the many forms in which this kind of plant food may be supplied, and particularly as former imported quantities will now be unavailable, the lines commonly encountered will be briefly described.

Inorganic Forms.

(a) Sulphate of ammonia contains 20.6 per cent. of nitrogen soluble in water, and the average quantity imported annually during the last ten years was 5740 tons. This fertiliser is a popular ingredient in pasture top-dressing mixtures applied to provide rapid growth for so-called "winter

grass" and also for ensilage and hay crops. It is also used in quantities for crop fertiliser mixtures.

(b) Nitrate of soda contains 15.5 per cent. of soluble nitrogen, and the quantity annually imported during the period under review amounted to 1760 tons, most of which was used for inclusion in crop mixtures.

The total imported fertilisers of the type amounting to 7500 tons will probably have to be replaced by other forms of nitrogen, and these will be described in detail.

— By —

A. G. ELLIOTT,
Crop Experimentalist,
Fields Division.

Organic Forms.

The freely marketable lines are produced as a by-product from freezing works and similar plants, and during the last ten years an average of 38,565 tons was processed. This includes a number of forms of fertiliser in which nitrogen, in a form insoluble in water, and phosphoric acid, also in insoluble form, are present in varying amounts. With these fertilisers generally, it is of interest to note that appreciable quantities of material formerly processed for use as fertilisers are now used in the preparation of stock foods and licks, and any increase in fertiliser supplies to replace imported stocks now unavailable will be governed by the facilities in the works and the demand for the two products. Organic fertilisers under this class are discussed under the trade names with which purchasers are familiar.

Need For Standards

(a) Blood and bone, of which the average annual total made during the period reviewed amounted to 22,333 tons, shows a very wide range from 4.0 to 8.0 per cent. of nitrogen insoluble in water, and from 8.5 to 19.6 per cent. of insoluble phosphoric acid. In view of the lack of uniformity of these two ingredients and also because of varying fineness of grinding, in addition to the fact that the selling price bears no relationship to unit values of either nitrogen or phosphoric acid, the matter of standardisation to specify percentage constituents and fineness of grinding, and a selling price based on unit values is worthy of early consideration.

Blood and bone is used principally in crop fertiliser mixtures, and has been replaced largely on grasslands by sulphate of ammonia, which is more easily handled by the distributing machine. In times of shortage of the latter there is no reason why the organic form of nitrogen should not be used on pastures with equally good

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results, especially in the higher rainfall districts where dairying is more extensively practised.

(b) Bonedust, of which the average annual production is 5218 tons, also shows a wide range in percentage com-

position from 2.3 to 5.5 per cent. insoluble nitrogen, and from 15.7 to 27.2 per cent. insoluble phosphoric acid. Particularly in view of the fact that the nitrogen-phosphatic ratio is affected by the processing of this fertiliser, and also because of price variation the matter of standardisation requires equal consideration with this fertiliser.

Bone-dust is used principally in crop fertiliser mixtures, and when finely ground is a very valuable source of phosphate to slowly developing crops, such as roots.

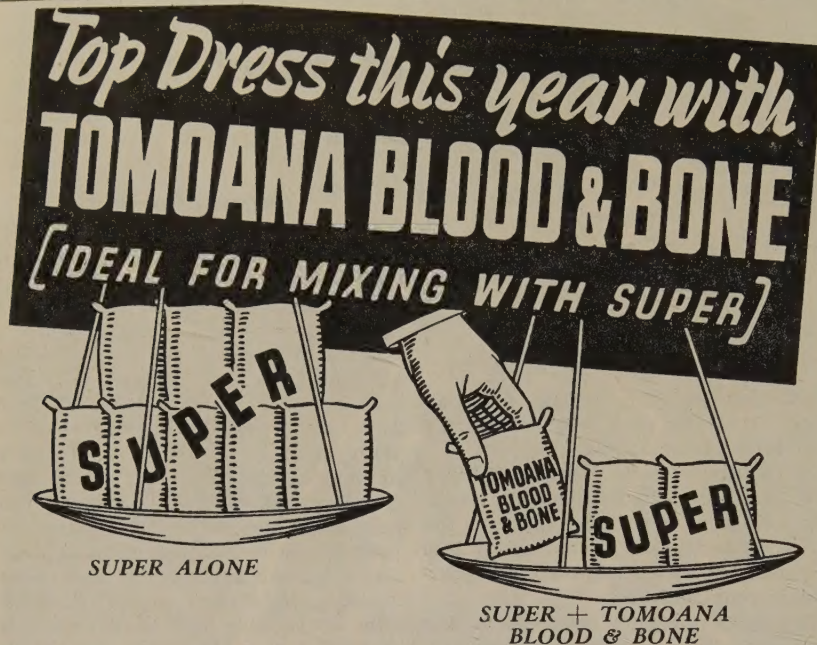
(c) Dried blood production amounted to an average total of 3,634 tons, with a range of insoluble nitrogen from 12.0 to 13.5 per cent., and was thus a fairly uniform material. It is used almost entirely in crop manurial mixtures.

(d) Other fertilisers produced under the names of bone char, char dust, containing only traces of nitrogen, and bone flour show a range in insoluble phosphoric acid from 22.0 to 27.5 per cent., and with tankage, which contains approximately 11.0 per cent. of insoluble nitrogen and varying proportions of insoluble phosphoric acid, are used principally in crop fertiliser mixtures.

Animal Manure

In addition to the processed fertilisers already described, the farmer has one most important source of plant food in the droppings and urine from the animals on his own holding. The spreading of droppings by harrowing pastures on which animals have grazed, or following the feeding out of hay or supplementary crops, has become standard practice, but wherever possible, on dairy farms particularly, the installation of equipment to collect voided material for application later to pastures and on land intended for crop should be planned. This return of plant food to the land from which it was originally removed gives a payable response in both growth of grass and increased yield of crop. The methods for the topdressing of liquid manure on dairy farms were described in the issue of the "Journal" for August, 1939.

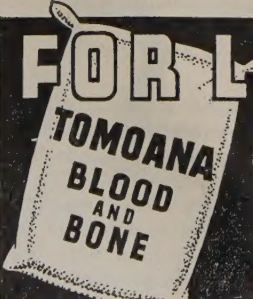
Under present conditions it is essential that no form of fertiliser should be wasted. All should be used. It is only by maintaining soil fertility that maximum production is obtained.



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Value of Organic Fertilisers In Horticulture

EMERGENCY conditions bring with them many changes in industry. These changes are not always well received, and generally opinions are strongly voiced that it will be impossible to carry on. The ruination of an industry is predicted.

Such a feeling is likely to occur among market gardeners and orchardists if it becomes impossible to import inorganic nitrogenous fertilisers; but will these producers be worse off? It is only in recent years that sulphate of ammonia and nitrate of soda have come into widespread use. Previously, other forms of nitrogen—forms that are available in quantity in New Zealand today—were used. It will be necessary to use them again, and it is not expected that agriculture or horticulture will suffer as a consequence. As soon as the crops get under way it will be forgotten that use was made of something that was different.

Admittedly, there are advantages for forms of soluble nitrogen. Late and early in the season, when bacterial activity in the soil is low, the rate at which nitrogen is made available is too slow for the optimum requirements of the plants. Improvements in soil cultivation so that it is kept better aerated and drained should make for a warmer soil which will assist both bacteria and plants.

At other seasons of the year when the soil is warm and the bacterial activity is increased the decomposition of organic forms of nitrogen is more rapid. The products of this decomposition are readily made available for the use of plants, and there is seldom any nitrogen starvation.

Maintenance Of Humus

Organic fertilisers have the important advantage of assisting in maintaining the humus level in the soil. This point is of paramount importance where the ground is under intensive cultivation year after year. By their use it may be possible to continue such a level of production a little longer without exhausting the soil and before sowing it back to grass.

There are commercial growers, orchardists, and small fruitgrowers who

By F. SYDENHAM,
Assistant Horticulturist,
Wellington.

are using nitrogen of organic origin with very satisfactory results, and whose operations are conclusive proof that these forms of nitrogen are entirely satisfactory. They claim—and rightly so—that these forms of nitrogen improve the soil and encourage the development of the bacteria which are so important, even though the cost of the nitrogen in the organic fertilisers may be a little more expensive than that in some inorganic fertilisers.

Unit Value

When considering the values of fertilisers the unit value system should be employed. The unit value of a fertilising ingredient is the price of 1 per cent. (or 22.4 lb.) of it in a ton. Thus, as ground rock phosphate contains 36 per cent. (approximately) of insoluble phosphoric acid and costs £4 10s. ex works, the unit value of the phosphoric acid is 2/6. When estimating the unit value of nitrogen in blood and bone, the value of the insoluble phosphoric acid must be taken into account. Thus, if a sample of blood and bone gave the analysis of 7.5 per cent. insoluble nitrogen and 10 per cent. insoluble phosphoric acid and

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was quoted at £8 15s ex works, the figure 25/- (10 x 2/6, the unit value of insoluble phosphoric acid in, say, ground rock phosphate) must be deducted. Then £7 10s. is the value of the nitrogen in the fertiliser. This, divided by the percentage of nitrogen, works out at £1 per unit.

The following table shows the unit values of nitrogen in the commonly-used nitrogenous fertilisers:—

Fertiliser.	Percentage of Nitrogen.	Quotation per ton.	Unit value of Nitrogen.
Sulphate of ammonia	20	£15/5/- ex store	£0 15 3
Nitrate of soda	16	£17/10/- „	1 1 10
Blood and bone*	7.5	£8/15/- ex works	1 0 0
Dried blood	12.8	£14/10/- „	1 2 8

* Allowance made for insoluble phosphoric acid as above.

The figures in the table show the nitrogen of sulphate of ammonia to be the cheapest form of nitrogen. There is not a great difference between the values of the other forms.

Potash Shortage

With potash in short supply, it will be to the advantage of all gardeners and fruitgrowers to use the insoluble

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- (2.) Increase soil aeration.
- (3.) Remove surplus soil water.
- (4.) Create a warmer soil.
- (5.) Feed your soil bacteria.

forms of nitrogenous fertilisers. Potash is useful to harden plant growth and assist it in overcoming disease infection. It is especially necessary to use it where the quick-acting fertilisers, such as sulphate of ammonia and nitrate of soda, are used, and which after application give a great stimulus to plant growth. With the more regular

growth produced by the organic manures a healthier growth is produced and one not requiring, to the same extent, the hardening effect of potash.

Where sulphate of ammonia has been used in the past and lime has not recently been applied to counteract the acidity produced, all gardeners and orchardists are strongly recommended to give a 30cwt. to 40cwt. per acre application of lime, and thus make every endeavour to produce soil conditions most favourable for bacterial development.



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Possible Replacement of Imported Potash

From New Zealand Sources

By R. E. R. GRIMMETT, Chief Agricultural Chemist, Wellington,
and A. G. ELLIOTT, Crop Experimentalist, Wellington.

THE importance of potash in farming generally may be realised from a study of the import statistics, which show that 5085 tons were brought into the Dominion in 1922, and in 1939 this quantity had increased to 18,396 tons. The totals include all forms of this fertiliser, and it is interesting to note that with an appreciation of the value of the 30 per cent. salts, now generally known on the market, as a pasture topdressing, this form of the fertiliser represents three-quarters of the total imported. Kainit, a 14 per cent. form, used mainly in cropping mixtures, showed a steady decrease mainly due to its lower potash content and difficulty in application as a topdressing, and now with the forms, muriate and sulphate of potash, is utilised almost solely on crops.

In view of the present position overseas, with the main sources of supply, France and Germany, unavailable and shipping difficulties precluding the exploitation of alternative markets, possible sources of supply within the Dominion are being investigated.

Potash Areas

Field trials carried out by the Fields Division and the results obtained by farmers throughout the Dominion have made it possible to define broadly the areas on which potash can be profitably used on grassland. These are in the Waihi district, on certain soil types in the Hamilton-Te Awamutu area, in North and parts of South Taranaki, and in Southland.

In times of shortage of potash, the restricting of its use to the grasslands of these areas, and to market gardening, tobacco and fruit growing is worthy of serious consideration. Its value to farm crops has not been clearly defined, and in these crops it is probably not an important factor in production.

The average importation of potash for the last three years is approximately 16,000 tons, and as the demand must exceed the present supply, officers of the Department of Agriculture, Geological Survey, and Dominion

Laboratory have been collaborating in an investigation into possible sources in New Zealand.

New Zealand Sources

Glauconite, which is found in greensand, is one possible source of potash, and in the Dominion there are extensive and often easily accessible supplies in a number of localities. At Waihao Downs, near Waimate, material containing up to 6 per cent. of potash may be secured by sluicing the outcrops, which in many cases also contain appreciable proportions of carbonate of lime.

Glauconite is a complex silicate material containing aluminium, iron, magnesium, and potash in variable ratios, and has been used extensively on crops in many overseas countries, and notably in the United States of America.

The Waihao Downs outcrops are in readily accessible areas where the material is easily crushed, and it is planned to use a consignment from this source for field trials.

Potash from Seaweed

Another possible source of potash is from seaweed, in particular the variety *Macrocystis*, of which extensive areas are found around the coasts of the Dominion. From material collected in the Marlborough Sounds area and dried

and ground, a possible fertiliser containing 17 per cent. of potash and 2 per cent. of nitrogen has been produced. It is estimated that ample supplies of potash are available from this source. In processing, the raw material is dried over fences and finely ground. Little potash is lost, provided drying is fairly rapid, and a trial consignment of the processed material is now being prepared.

In order to compare these Dominion products with imported 30 per cent. potash a series of observational topdressing trials has been planned for the districts already defined. All plots will be topdressed with superphosphate at the rate of 3 cwt. per acre, and comparisons will then be made between sections on which ground, dried seaweed, glauconite, a lime-glauconite combination, and 30 per cent. potash have been applied at the rate to supply the same quantities of potash to each in the series. It is hoped to lay down five duplicate series in each of the North Taranaki, Waihi, and Southland districts this spring, and results will be watched with considerable interest.

If any of the local supplies prove successful under field conditions, local labour can be absorbed, deliveries better arranged, and storage will not present the difficulties now experienced with the 30 per cent. form. A substantial saving in overseas exchange may also be made.

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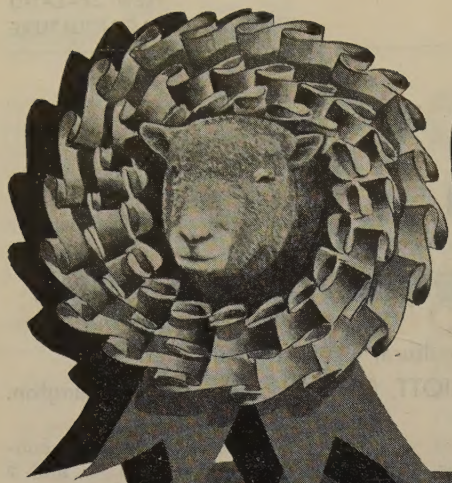
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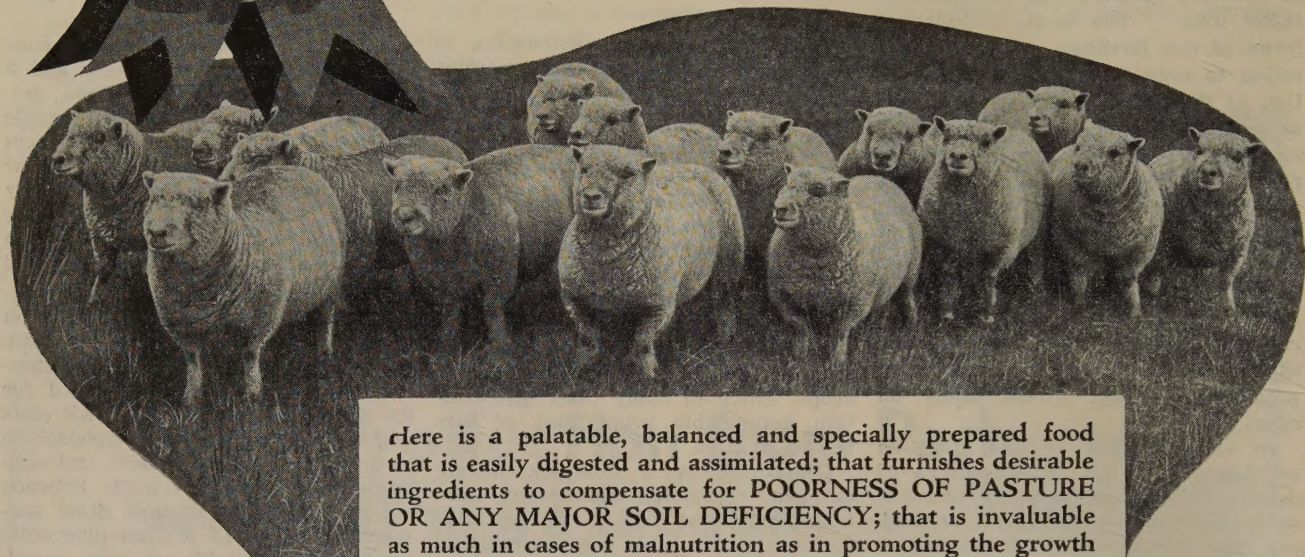
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— By —

P. S. SYME, Instructor
in Agriculture, Warkworth.

Selecting Species Suitable For Local Conditions

(Continued from the August issue.)

ALTHOUGH tall windbreaks are frequently very desirable, particularly on flat and exposed country, they are not always practicable where the land is valuable or the farm small; but whether they are provided or not, the importance and value of a series of well-designed, low shelter hedges to protect individual fields can scarcely be over-estimated. These hedges need not necessarily be very extensive, and should be so planned and situated as to afford the maximum of protection for a minimum of cost.

The ideal hedge should establish easily and quickly to form a dense, impenetrable windbreak non-poisonous to stock. It should also occupy little space, require a minimum of attention, and should have a long, useful life. Such a hedge should itself be immune to disease, and should not harbour diseases or pests. If, in addition to possessing all of these good qualities, the hedge would require no fencing, then it would indeed be perfect.

Unfortunately, in an imperfect world we can scarcely hope to find a per-

fect hedge, and must simply endeavour to select the species of hedge plant which most nearly conforms to the varying local requirements and conditions

Main Species

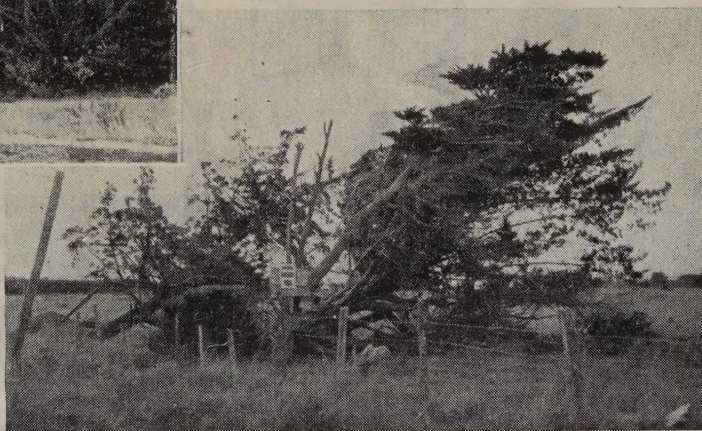
Although the list of possible hedge plants is a long one, practical requirements on the average farm can generally be met by a selection from the following species:—*Cupressus lawsoniana*, *Cupressus Benthamii*, *Cupressus macrocarpa*, *Hakea saligna*, seedless barberry, *Acacia verticillata*, boxthorn, *Eleagnus japonica*, bamboo, and under certain conditions New Zealand flax and pampas grass may well be worthy of inclusion.

Of all the species mentioned, *Cup. lawsoniana* most nearly conforms to the ideal, but unfortunately it is not very tolerant of wet soils or of saline winds. In the well-drained pumice and alluvial soils of the Waikato and



Fig. 4 (above).—When planted close and topped at about 10ft., *Cup. macrocarpa* is capable of providing excellent shelter.

Fig. 5 (right).—When grown for timber, it should not be planted where the water table is too high to permit of deep rooting. Note the shallow rooting system where grown on poorly drained land.



Rotorua districts it is almost the perfect shelter hedge.

On heavy clay soils which tend to lie wet through the winter months, *Lawsoniana* has not generally proved very successful, and on this account it is seldom seen growing well as a farm hedge on the gumland soils. When intended for low shelter, the plants should be spaced at about three to four feet apart. For taller breakwinds where the hedge is to be untrimmed, the distance between the plants may with advantage be extended to about six or seven feet.

Cupressus Benthamii

On soils which are rather too wet for *Lawsoniana*, *Cup. Benthamii* may sometimes be planted with success. Apart from its better toleration of moist conditions, the essential requirements of this species are somewhat similar to those of *Lawsoniana*. It is, however, a faster grower than *Lawsoniana*, but does not usually provide quite so dense a hedge. Plants may

be spaced at about the same distances as for *Lawsoniana*, according to the object in view.

Cupressus macrocarpa

Because of its adaptability, this species is suited to a wide range of soil conditions, and has proved highly successful even on heavy gumland clay soils. Although it is not altogether ideal for low shelter, its ability to thrive where other hedge plants often fail makes it worthy of special consideration on heavy clay soils which tend to lie wet through the winter, and, if topped at about 10 ft. and occasionally cut back, such a hedge, if not spaced too wide, will provide useful dense shelter for quite a number of years.

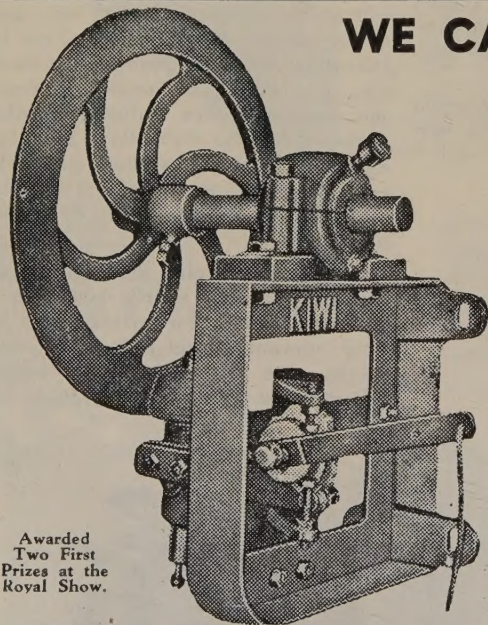
When grown for low shelter, plants may be spaced from about 4 ft. to 6 ft. apart. Plantings are sometimes made at 9 ft. intervals, but for low shelter this is too wide, as the plants take longer to close the gaps and the

hedge tends more readily to open at the base.

Hakea saligna

Hakea saligna (plain-leaved hakea) is particularly well adapted to the heavy gumland clays of North Auckland, where it is a rapid and vigorous grower and succeeds well on soils which are naturally very poor and which tend to be wet and cold throughout the winter. *Hakea saligna* also has the distinction of being practically the only hedge which can be easily grown on certain of the semi-barren ironstone soils.

Protection must be afforded against stock in the early stages, but, once well grown, the hedge is fairly resistant to stock, and one or two barbed wires will usually prove sufficient provided the fence is not placed too close to the hedge. If well wrenched, *Hakea saligna* transplants easily, and quickly provides effective shelter. The plants are usually spaced at about 1½



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Fig. 6.—Grown by itself, *Eleagnus* is apt to become somewhat untidy unless trimmed.



Fig. 7.—If interplanted with tall-growing trees it will grow to a considerable height and forms a useful tall windbreak which does not require trimming.

to 3 ft. apart, according to the type of hedge required.

Acacia verticillata

A hedge of *Acacia verticillata* also succeeds well on the heavier clay soils. As it does not, as a rule, transplant well, hedges are usually grown from seed. The ground should be clean and well cultivated to assist growth and establishment in the early stages. The seed is generally sown about September at the rate of about 1 oz. per chain.

If good, well-wrenched plants are available they may be successfully planted out on well-prepared ground in late August or September, and should be spaced at about 18 inches apart in the row. The hedge will grow to a height of about 10 feet, and it should be well trimmed after the first year to provide thick, bushy growth.

Because of its prickly nature, fencing is almost unnecessary once the hedge

is properly established. As the prickles are apt to lodge in the wool, this hedge is not very suitable for sheep.

Seedless barberry

Seedless barberry succeeds best on free, well-drained soils, and commonly fails on heavy clay soils or where drainage is poor. Provided conditions are suitable, however, barberry forms an excellent stock-resisting hedge which does not require fencing, and which can be very easily established from cuttings. Although the cuttings may be planted direct, in practice it will usually be found that many will fail to strike, so that the establishment is rather patchy and somewhat slow.

The best results are to be expected if the cuttings are started in a nursery bed where the ground has been well worked and where weeds can be easily controlled. If planted in this way from June to August the cuttings will have rooted freely and will be

ready for planting out by the following spring. The plants may be put in a single row spaced at about 15 to 18 inches apart under the fence, where they will be safe from stock. If the ground can be worked over before planting the young plants establish better and make more rapid growth. Thorough firming in position is a great help, and it is important that each plant should be well heeled in.

Eleagnus japonica

When grown by itself, a hedge of *Eleagnus japonica* is apt to become straggly and untidy, but when grown in conjunction with barberry on suitable soil it will provide dense shelter, although it requires frequent trimming. If it is interplanted with tall-growing trees, such as Lombardy poplar, *Eleagnus* is capable of growing to a considerable height and forming a dense, draught-proof hedge which requires no trimming.



Fig. 8.—*Cup. Benthamii* will grow on land which is rather too wet for *Lawsoniana*, and makes an excellent shelter hedge.



Fig. 9.—Pampas grass provides excellent low shelter, and has the added recommendation of providing valuable food for times of scarcity.

Although *Eleagnus* establishes easily from cuttings, the best results are obtained if the cuttings are first rooted in a nursery and transplanted to their permanent position in the second year. *Eleagnus* is not readily affected by salt winds, and will grow well even on poor, heavy, clay soils. It has proved highly successful throughout the Northern gumlands under conditions which are quite unsuitable for many of the commoner hedge plants.

African boxthorn

African boxthorn is well-known as a rapid grower which quickly forms a very thorny stock-proof hedge, and is particularly well suited for coastal districts because of its ability to withstand salt-laden winds. It succeeds quite well even on poor, light, sandy soils, but almost invariably fails on heavy land or where drainage is bad.

Although it makes an effective barrier to stock, it is rather objectionable because of its sharp spines, which may be dangerous to stock, and which make trimming a somewhat difficult job. Plants are easily raised from seed, and are also cheap to buy. When planting a hedge they are usually spaced at about 18 inches apart.

Bamboo Hedges

Bamboo hedges have proved highly successful in flat, alluvial wind-swept areas in certain districts where other hedges are not easily established. The young plants are usually planted in the autumn in a single row about 1 ft. apart, and quickly establish to form a dense wind-proof barrier. As the young shoots are readily eaten by stock, the plants must be protected by fencing.

Pampas Grass

Pampas grass is well adapted to provide low, dense shelter, and has the added advantage of requiring no trimming. Where winter or spring feed is scarce, stock may be allowed access to the hedge, which will again make sufficient growth to provide shelter during the coming winter. Well-rooted cuttings or one-year-old seedlings may be used, and can be planted out about 6 ft. apart in August or September.

Unless some care is taken in preparing the ground establishment is

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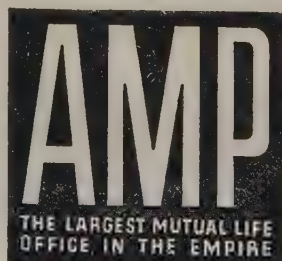
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Fig. 10.—*Hakea saligna* is a quick grower which succeeds well even on heavy gumland soils which lie wet through the winter. It is a quick grower which provides excellent shelter. Photograph shows a four-year-old hedge.



Fig. 11.—Black wattle was at one time very popular for mixed shelter belts. Because of gall fungus (see illustration), its use cannot now be safely recommended.

often poor, and this particularly applies where root cuttings which have been transported from a distance are used. Where time permits, the best results are obtained by planting one-year-old seedlings 1 ft. apart in a nursery, and transplanting them to well-prepared ground in the hedgerow the following year.

New Zealand Flax

New Zealand flax provides fairly effective low shelter for stock on soils where it grows well and where plants can be easily obtained. The plants may be set in continuous double rows spaced about 5 ft. each way, or simply planted in clumps in the corners of the fields. Only good, well-rooted fans from strong-growing plants should be used, and planting is best done in the spring, when the risk of heavy frost is over.

Home-growing of Seedlings

Nurserymen throughout the country carry excellent stocks of young trees, and can readily supply every variety suitable for the farmer's requirements. Where the numbers needed are small, it is usually most convenient to purchase supplies as they are required. If, however, a fairly extensive programme is contemplated and if time permits, it may well pay the farmer to grow his own trees. Pines, cypresses, and eucalypts can be raised from seed

in the open, and species such as poplars, *Eleagnus*, seedless barberry, bamboo, pampas, and flax can readily be propagated from branch or root cuttings according to the species.

When sowing in the open the seed may be sown from October to December, selecting light, clean, well-drained garden soil, and sowing in shallow trenches, covering each row with not more than $\frac{1}{8}$ in. to $\frac{1}{4}$ in. of light, free soil. In dry weather some watering may be necessary. When the seed has been sown it should be protected from the sun and from birds by a covering of scrim or sufficient light branches to give adequate shade and to prevent the ground from drying out. Soaking or scalding is undesirable, except for wattle, and if conditions are favourable the seeds will germinate within three to four weeks.

The percentage of germination is somewhat erratic, but under average conditions the following numbers of plants should be obtained from 1 lb. of seed of each species:—

Cup. lawsoniana: About 20,000 plants per 1 lb. of seed.

Cup. macrocarpa: About 5,000 plants per 1 lb. of seed.

Pinus radiata: About 10,000 plants per 1 lb. of seed.

Eucalypts vary from about 3,000 plants per lb. for *E. coriacea* and *E. pilularis* up to 15,000 for *E. eugenoides* and 30,000 for *E. viminalis* and *E. marathuri*.

The young trees are usually transferred to nursery rows when about 6 in. high, where they are kept free from weed competition by hand-hoeing until the autumn of the second year after planting. In order to develop the growth of fibrous roots which will promote speedy establishment, the young plants should be "wrenched" with a sharp spade about six weeks before they are to be transferred to their permanent positions.

Striking Cuttings

Where plants are being raised from cuttings it will be found that they strike best in light, well-drained soil. If cuttings are simply pushed into the ground from the surface the bark is apt to be skinned off, resulting in a poor strike. For this reason the ground should first be nicked open with a spade, the cuttings inserted against one side, and the other side pressed back firmly in position. If the soil is at all heavy a narrow trench should be prepared and the bottom covered with a layer of sand. The cuttings are then placed with their butts resting in this, and the soil is then returned and firmed back in position.

Planting Young Trees

The best time for planting operations depends very largely on the locality. Where the winters are mild, excellent results may be expected in late April or May. If severe frosts are likely,

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Pinus Muricata	from 15/- to 27/6
Macrocarpa	from 25/- to 50/-
Ornamental Hedge Plants	from 30/- to 40/-
Lawsoniana	from 35/- to 75/-
Eucalyptus	from 10/6 to 20/-
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planting is best deferred to the spring. Only deciduous or very hardy species should be planted in the coldest winter months.

If possible, the ground should be prepared some months in advance either by cultivation or preparing the holes. A handful of equal parts of superphosphate and blood and bone applied to each tree greatly assists the establishment and early growth. When planting, take care that the roots are on no account permitted to dry out, and set each plant at its original depth. The ground should be well firmed around each plant, and the rows should be inspected from time to time so that any plants which may have been loosened by wind can be re-set.

Protection From Stock

The provision of good shelter makes fairly heavy demands on labour and money, and unless the work is carefully and methodically performed the results may prove disappointing. It is unfortunate that the most effective species of shelter plants require fencing, but this fact must be faced.

The advent of the electric fence offers excellent prospects of greatly reducing the cost of this item, and its

economic use of wire is a particularly strong recommendation at the present time. The importance of allowing sufficient room between the plants and the wire is very frequently overlooked, and often explains why so many promising hedges quickly become bare at the bottom.

In conclusion, the most serious mistake—and that which can most easily

be avoided—lies in the selection of species unsuited for local conditions or for the purpose in view. In practice, the safest policy is to plant those species which are seen to succeed best under conditions similar to one's own, and if in doubt, to consult an experienced nurseryman who knows the district.

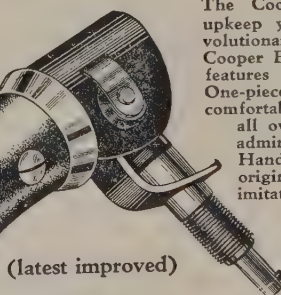


Fig. 12.—*Acacia verticillata* succeeds well on the Northern gumlands, and because of its prickly nature requires little fencing. The above is a four-year-old hedge grown from seed.



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A service for the examination of the semen of bulls with a view to indicating their fertility has been inaugurated by the Department

of Agriculture, and farmers are urged to take advantage of this system of testing, the value of which is outlined in this article.

Service Inaugurated For Testing Fertility Of Bulls

FOR many years in horse-breeding countries it has been common knowledge among those connected with this work that certain stallions were considered to be poor getters, and a good deal of blame has been thrown on these horses for the failure of mares to get in foal, but the important part played by the male in the reproductive state of our herds and flocks has not been so generally recognised by the farming community.

Farmers realise that some bulls have been very sure and have been able to put quite large numbers of cows in calf with very few returns, but some farmers have experienced cases of extremely low fertility or even of total infertility among bulls used in their herds.

The good bull and the totally sterile bull are more or less understood, and should be fairly quickly recognised by the owners, who are usually watching results very carefully; not so the bull of poor fertility, because there is an impression among many people that if a bull can put a few cows in calf he can manage the herd. Between the highly fertile bull at the top end of the scale and the sterile bull at the bottom

By T. A. BLAKE,
Veterinary Research Officer,
Ruakura Animal Research
Station.

end come the bulls of medium and low fertility.

Sires of High Fertility

The highly fertile bull can be dismissed in a few words, but he should not be dismissed without serious thought, because there is a big percentage of only moderate bulls about.

One bull examined and classed as very good was reported by the owner to have been successful in putting 40 cows in calf at the first service out of 41 in the herd. The one cow that returned was thought to be in an abnormal breeding condition, but, taking the figures as actually given, this bull may be said to have had a 97 per cent. fertility. As a matter of interest, the service of this bull was sent to the writer as a test sample, the bull being classed as "very good" without any knowledge of results in the herd or even of ownership of the bull.

Another bull which was tested and classed good this past season was 100 per cent. successful on 27 cows at the first service, although three heifers needed two services each.

Good Bull's Record

The percentage success at first service of a bull examined for several years is remarkable enough to give as an example of a good bull's record, and is as follows:—

Ninety-one per cent. in 1932, 82 per cent. in 1933, 78 per cent. in 1934, 88 per cent. in 1935, and 74 per cent. in 1936, making an average evident fertility of 82 per cent. over five years in one herd.

If this bull also produced good-quality stock, what a prize to a farmer!

In 1937 this bull was purposely put into a herd which had been giving trouble, and he was not able to show the usual results at first service, being only 42 per cent. successful. However, in 1938 he rose to 91 per cent. again on 61 cows, and thus helped to retrieve the position of the herd and his good reputation. The writer was naturally

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pleased at this result because of his recommendation of the bull to the new owner. During the past season, at nine years of age and getting very slow, his service again appeared good under the microscope, and he put all the 58 cows in calf satisfactorily, although he only showed 57 per cent. success at first service.

Such bulls as these are not to be picked up every day, and should not be sent to make bully beef without good reason.

How many nine-year-old bulls will be kept solo in a herd of 58 cows in the dairying districts of this country?

Sterility and Low Fertility

Going to the other extreme, the farmer should soon recognise the sterile animal, because all the cows return one after the other and a large percentage will return to the bull of low fertility, although it sometimes happens that a bull is well in his second round of service before his uselessness is fully realised. No fewer than 45 sterile bulls have been examined.

In support of this statement concerning the reluctance of the farmer to blame the bull for the return of the cows, two epidemics of sterility investigated last season may be quoted. In one case, 43 cows received 64 services without one cow holding, and a new bull was not procured until the first week in December, when the original bull was declared sterile. In another outbreak, 25 cows were served once and the first six returns were served a second time with a total of one conception before another bull was put in.

Both these bulls were diagnosed as sterile by the writer on two occasions, and fresh bulls were entirely successful in both herds. The result of such sterility in the male will be well understood by the dairy farmer, and it must be remembered that rams, boars, and horses can be affected in the same way.

Guide to Fertility

Professor Williams, of New York, pioneered the work, showing that examination of services in certain ways provided a guide to the fertility of bulls and horses according to the various characteristics of the semen. In the 1939 edition of his classic work "The Diseases of the Genital Organs of Domestic Animals," he shows on pages

376, 380, and 381 photographs of the sperms of three bulls whose services were collected by the writer during the years 1930, 1931, and 1933, and all three bulls were located near Hamilton.

The method enunciated by Professor Williams has been largely followed during the examination and classification of many hundreds of bulls, together with a few rams, boars, and horses during the past ten years in the Waikato. During these years a classification of bulls by examination was developed, which, generally speaking, has stood the test of time, and from this work has arisen the desire of the Department of Agriculture to open up an examination service available to farmers throughout the country.

A Special Test

In order to test the reliability of our method of classifying the fertility of bulls, the writer was deputed to examine and classify a large number of bulls during the past season and foretell as nearly as possible the result likely to be obtained by these bulls in actual service in the herds.

Mr. A. H. Ward, of the New Zealand Dairy Board, supplied a list of farmers who were in the habit of keeping the Board's Sterility Survey Scheme books for recording all services in detail, and books were supplied to other farmers who were good enough to help in this scheme by giving facilities for the collection of services from their bulls. These books were collected at the end of the season and sent to Mr. Ward, who has kindly made a statistical analysis of the data furnished by these farmers, and this is presented in a separate article in this "Journal."

The scheme included monthly examinations of the various bulls in order to see any fluctuation in the quality of their services as the season progressed, but only 15 were sampled three or four times, 17 were sampled twice, and the remainder only once.

Results of Tests

Ninety-six bulls on 50 different farms were examined, the number of semen collections being 153.

The bulls were divided into five classes, from which the following results were expected:—

Good, 100 to 70 per cent. successful first services.

Moderate, 70 to 50 per cent. successful first services.

Unsatisfactory, 50 to 30 per cent. successful first services.

Bad, 30 to 10 per cent. successful first services.

Sterile, 10 to 0 per cent. successful first services.

Eighty-three bulls were examined fairly early in the season or before their performances were known, the remaining 13 being visited because of breeding trouble in the herd. Four of these 13 were diagnosed as sterile by examination, although it is admitted that

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the examiner was aware of the position in three of these four cases. Five bulls were examined because they had been seen in previous years, and were therefore of some interest.

A full report of each examination was made, the farmer was notified as to the classification of his bull or bulls, and smears showing the various characteristics of the services were kept for further reference if desired.

Value of Examination

It has been established that examination of the service of bulls of high fertility or of those of very low fertility usually indicates the class to which they belong and enables the examiner to make a fair statement of the probable results to be obtained by such bulls in an ordinary herd. In short, it may be said that normal services usually indicate a highly fertile sire while, on the other hand, grossly abnormal features **always** indicate a diseased state of the sexual organs, resulting in low fertility.

Although the grossly pathologic service is easy to classify, it will be understood that the difficult bulls to assess are those giving services which are neither good nor bad. These must be considered moderate or unsatisfactory according to the various abnormalities found by the examiner, and, in view of the fact that some characteristics of semen may alter from day to day, it will be realised that there is a difficulty in classifying these half-way sires, some of which will do better and some worse than expected.

This difficulty is not a serious one in practice, because the owner would not get rid of a bull said to be moderate in fertility, and there is practically no danger of a valuable bull being culled without a fair trial, the examiner usually being called in to confirm the farmer's suspicions. The knowledge that a bull possesses a low fertility need only invite the owner to use caution until results confirm or negative the suspicion concerning the animal.

The sire of low fertility is the one which misleads the farmer, because a few cows get in calf, and thus this bull may be more dangerous in a herd over a period of two or three seasons than the sterile one, which is often quickly suspected and replaced.

History of Herd

There is no doubt that the value of semen examination is enormously in-

creased if it is coupled with the history of the bull and the herd. Two instances may be cited in support of this. One bull classified as good was nine years old and getting slow to serve. Such a bull would not be classed as good in the ordinary way except with some note of warning that caution should be used concerning him if expected to serve many cows. It is not surprising that only 52 per cent. of his services were successful. This bull is the one mentioned above as being 82 per cent. successful during five years in his first herd. Another bull

classified as moderate was infected with trichomoniasis, yet the semen did not show much abnormality. Only 28 per cent. of his services were successful. The breeding state of this herd was not good apart from the aspect of trichomoniasis.

Whenever possible, histories should be taken into account in assessing the usefulness of a bull, because it must be remembered that even a good bull will give disappointing results in a herd of low breeding capacity, such as may be seen after an epidemic of abortion.



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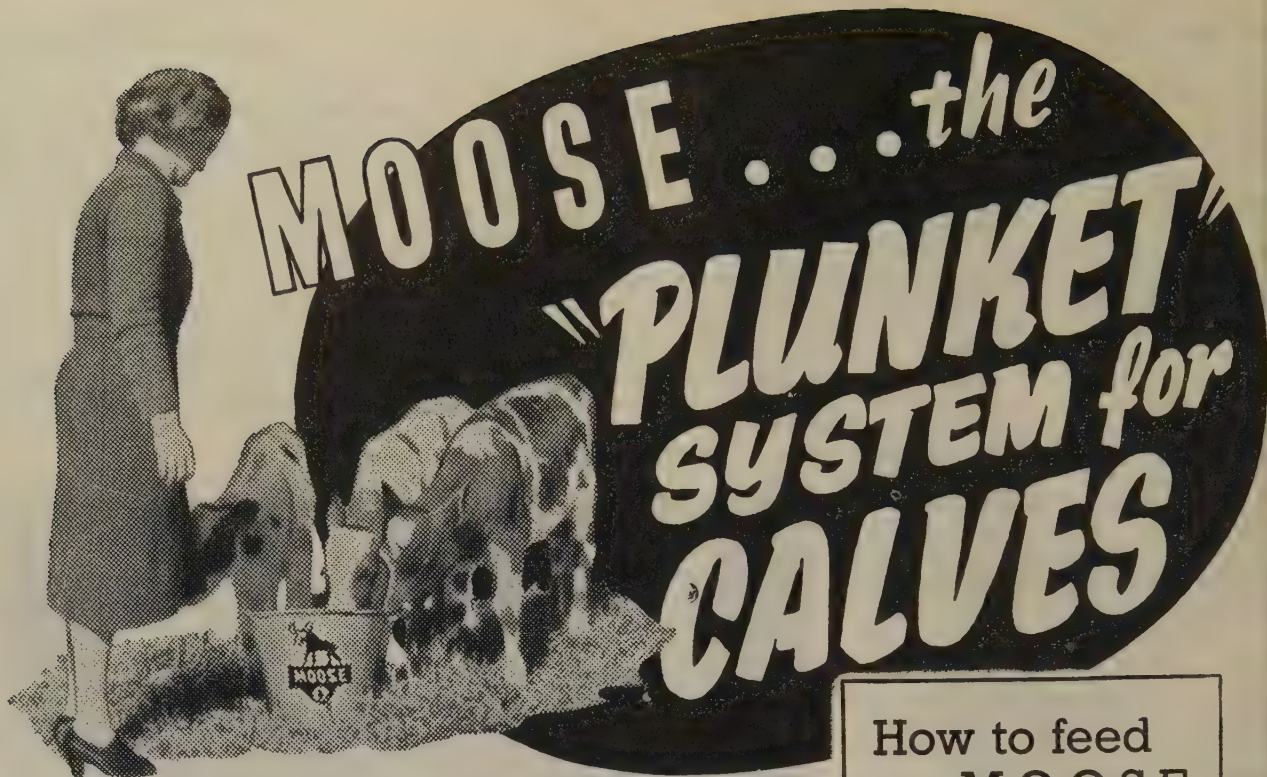
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In the case of the sterile bulls examined, there was no need of any history, although this was known in two of the three cases, because the services were so grossly abnormal that no difficulty was experienced in diagnosing these bulls as being useless.

During the season four bulls were classed sterile, but records were not available for one of these, and therefore only three are shown in the tables. The owner of the missing bull brought the sample in himself with the history that practically all the cows were returning. It is not much wonder that the cows were returning when the service was almost devoid of sperms. One of the sterile bulls showed not one sperm in four services instead of the several thousand million which may be expected from a bull of high fertility.

Service Now Available

Having established sufficient proof that examination of semen does usually indicate the fertility of the bull, the Department of Agriculture has de-

cided to make this examination service available to farmers in New Zealand.

Practically all veterinarians and stock inspectors throughout the country will know the method of getting semen samples and of forwarding them for examination and classification.

If for any reason a farmer wants advice concerning the breeding efficiency of his bull or bulls, he is invited to consult the veterinarian or stock inspector in his district, who will make arrangements to obtain a service for examination. The results of the examination will be returned to the veterinarian or stock inspector as soon as possible, and he will pass them on to the owner.

Dairy farmers are urged to discuss these results with the local veterinarian or stock inspector before taking any action in regard to the culling or destruction of a bull. Neither this nor any other biological test can claim 100 per cent. accuracy. Consequently, if a young or valuable bull is classed as unsatisfactory or even bad or sterile it may be wise to rest him and have him

retested before disposing of him. The great importance of getting the cows in calf quickly would, however, make it advisable to utilise the services of a bull of higher fertility during the period intervening between the two tests.

Don't Be In Doubt

Whenever there is any doubt concerning the accuracy of the first test, always ask for a second test.

By means of this wide organisation the bulls of very low fertility should be picked out early, and the farmer will be able to replace them before the season has advanced very far. If this examination service is wisely utilised, many more cases of breeding trouble in the herds will be understood and several of these may be speedily remedied.

Thanks are due to the farmers who gave their assistance in this fertility testing experiment, and to Mr. Ward for his assistance in collecting the data and examining it statistically.

What Was Revealed From The Figures

By
A. H. WARD,
Technical Officer, N.Z. Dairy Board

Highly Satisfactory Results Of Practical Test in Waikato

With the co-operation of a number of farmers in the Waikato district, semen examinations of herd sires were recently undertaken to secure detailed information on the degree to which a bull's fertility could be assessed at the start of the mating season. The results were so highly satisfactory that they are described in this article to illustrate the value of the more comprehensive scheme.

IN common with the experience of most dairying countries, the annual loss in New Zealand from temporary and permanent sterility in dairy cattle is very considerable. The exact extent of this loss is still being investigated, but recent work by the New Zealand Dairy Board in collecting material on various aspects of wastage in dairy stock* supplies a basis that is at least on the conservative side.

From this report it appears that some 3 per cent. of all cows are culled from the herd each season because of sterility and abortion, approximately 7 per cent. fail to conceive, and some 12 per cent. of the cows which have conceived require three or more matings.

But, so far, this only deals with the part contributed by the cow—what of the question of sterility in bulls? Information in the same report shows

that approximately 3 per cent. of all bulls in use are culled each season because of sterility, and, added to this, 8 per cent. of all bulls require an average of more than two matings per female before getting the cows in calf.

This information indicates the disturbing magnitude of our sterility problem, and it is therefore of considerable interest to learn that the Department of Agriculture is now preparing a field

measure for immediate adoption by which it is hoped to check up on the fertility of herd sires before the mating season is too far advanced for remedial measures. Such a policy should at least assist the dairy farmer by reassuring or forewarning him of the probable influence of his herd sires on the fertility of the herd.

Source of Data

In order to secure detailed information on the degree to which a bull's fertility could be assessed at the start of the mating season, arrangements were made with a number of farmers in the Waikato district to carry out semen examinations for their herd sires, and later to secure full details of all matings. For the latter purpose all co-operating members were supplied with booklets in which full details of all matings could be written up, and the results obtained at the end of the season. By this means an adequate check could be secured on the degree to

which Mr. T. A. Blake's work on semen examination would, in actual practice, forecast the bull's fertility.

One clear distinction must, however, be kept strictly in mind—the examination of the bull's semen provides an estimate of the fertility of that bull under conditions of mating which assume the females to be completely fertile. In other words, we could say that the semen examination, if accurate, would indicate the extent to which the bull **alone** was influencing fertility in the herd. The result of the bull's fertility, when measured by the number of services per conception, automatically includes a measure both of the fertility of the bull and the fertility (or infertility, as the case might be) of the cows to which he is mated. Mates of good fertility would help him to express his fertility to the fullest, whereas mates of poor fertility would be responsible for an increase in the

number of matings necessary per conception.

Influence of Cows

This leads to a further difficulty in tabulating the general results of this investigation, namely, to what extent should matings to cows which later prove to be "empty" be loaded against the bull in assessing his fertility index. Obviously, the number of matings to a cow which is sterile is limited only by the persistence of the owner in trying to get her "in calf," and the bull, no matter how fertile, would be penalised to that extent.

As dairy farmers invariably mate more than one bull to a cow which is persistently returning, it is probable that the failure of the cow to conceive after a number of matings can be largely attributed to the poor fertility or sterility of the cow herself.

All "empty" cows in the herds under this investigation were mated to more



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than one bull, and consequently the method of classifying bulls on the number of matings per conception for only those cows which later prove to be "in calf" has been adopted. (Actually, the analysis of these results on the basis of all services, including services to "empty" cows, makes little difference to the general conclusions to be drawn from the investigation.)

Analysis of Matings

The general results of all matings is shown in Table 1, and it will be seen that approximately 63 per cent. of all fertile cows held to the first mating. This is a slightly lower figure than that found in the industry generally, and is probably due to the inclusion of several herds where Mr. Blake's assistance was sought because of trouble experienced in getting the cows in calf. Approximately 7 per cent. of all cows failed to conceive, and this agrees very closely with the general figure obtained in other investigations.

TABLE 1.

Analysis of Matings in 44 Herds where Semen Examinations were made.

Mating.	No. of cows holding.	Percentage of all fertile cows.
1st mating ..	1,641	63.7
2nd " ..	621	23.7
3rd " ..	236	9.0
4th " ..	96	3.7
5th " ..	17	0.6
6th " ..	8	0.3
Total cows in calf ..	2,619	100.0
No. of cows not in calf ..	204	7.2 of all cows

Semen Examination

Of the 96 bulls examined by Mr. Blake, 30 had to be omitted from Table 2. The reason for the majority of these omissions was that the owner did not keep satisfactory records of the results of all matings. In six cases the number of cows mated to the bull was less than 10 (it was not considered desirable to classify a bull on the results of less than ten matings), and in three instances the service did not provide a satisfactory sample for examination. Two other bulls were omitted, one because he was used in a herd affected with trichomoniasis, and the other was sold before mating began.

Where more than one examination of the semen has been made the bull has been classified on the results of the first examination. This then keeps the analysis strictly in line with the results to be expected if the work of

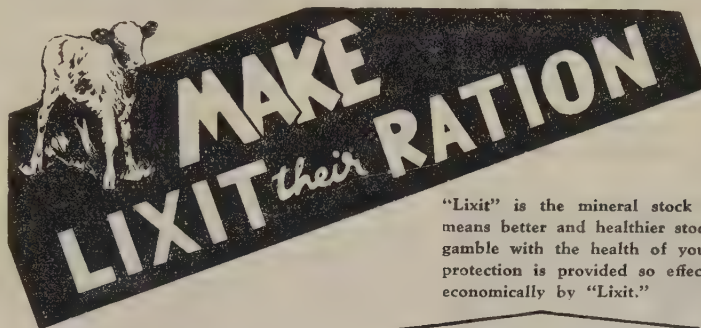
semen examination is carried out on a practical basis as a general field measure in combating sterility.

Table 2 shows the fertility index of the bulls and the manner in which they were classified on the basis of the semen examination. (The fertility in-

dex is calculated by dividing the number of "effective" matings—that is, the number of conceptions—by the total number of matings and multiplying the result by 100. Thus, a bull classified as 70 per cent. would have secured 70 conceptions out of every 100 matings.

TABLE 2.
Matings to Fertile Cows Only.

% of Fertile Matings (fertile cows only).	Semen Examination.				TOTAL.
	Good (100-70%).	Moderate (70-50%).	Unsatisfactory. (50-30%).	Sterile (10-0%).	
91 - 100 ..	2	1	—	—	3
81 - 90 ..	6	3	—	—	9
71 - 80 ..	13	5	—	—	18
61 - 70 ..	5	9	2	—	16
51 - 60 ..	4	4	—	—	8
41 - 50 ..	—	4	1	—	5
31 - 40 ..	—	3	2	—	5
21 - 30 ..	—	—	—	—	—
11 - 20 ..	—	—	—	—	—
1 - 10 ..	—	—	—	1	1
0 ..	—	—	—	1	1
Total ..	30	29	5	2	66
Av. % Fertility:	74	64	48	1.5	—



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As will be seen:

30 bulls classified "Good" have an average fertility index of 74 per cent.

29 bulls classified as "Moderate" have an average fertility index of 64 per cent.

5 bulls classified "Unsatisfactory" have an average fertility index of 48 per cent.

2 bulls classified "Sterile" have an average fertility index of 1 per cent.

Examination Of Results

Examining the table in greater detail we have the following results:—

(1) Bulls Classified "Good."

Of the 30 bulls so classified, 21 have definitely proved the soundness of their classification by securing in actual practice a fertility rate of better than 70 per cent. Five of the remaining nine bulls were between 61 per cent. and 70 per cent., and the other four were between 51 per cent. and 60 per cent. To what extent the mates of these bulls were responsible for a lower fertility rate and to what extent the classification may be at fault it would

be impossible to say; it is probable that both factors share some responsibility.

In any case, it is obvious that the bulls classified "good" on the semen test have proved satisfactory in their field results. In spite of the possibility of adverse "herd" conditions, at least 70 per cent. have equalled their classification.

(2) Bulls Classified "Moderate."

Of the 29 bulls classified "moderate," 13 equalled their classification in their actual results, nine improved on the classification (which suggests that the semen examination had somewhat under-rated their fertility), and seven showed poorer results than their classification. Again, the fertility rate for these seven may have been influenced by mates of "poor" fertility, and certainly by no means all of the responsibility can be attributed to error in the semen test.

However, even assuming such to be the case, it will be seen that only 24 per cent. of the bulls classed "moderate" could have been regarded as in any way "unsatisfactory" by the farmer, and probably of those seven, only three (40 per cent. or lower), could be regarded as of sufficiently poor fertility to warrant consideration of replacement for that reason.

(3) Bulls Classified "Unsatisfactory."

Of these bulls, two have shown definitely better mating results than the classification indicated, and to that extent the semen examination has been at fault, but the other three have warranted Mr. Blake's classification.

(4) Bulls Classified "Sterile."

No comment is necessary here except to indicate the definite accuracy of the classification. Mr. Blake has already discussed these two cases in his section of the report.

The real importance of semen examination work cannot, however, be better emphasised than by these two cases. The great economic loss entailed in mating these two bulls on 64 and 32 occasions respectively (indicating that the owners believed the bulls to be fertile) before putting in new bulls could have been avoided by use of the semen test before mating began.

Summary

Summing up the general results of Table 2, it will be seen that, on the whole, Mr. Blake's work in forecasting the mating results on the basis of the semen test has proved sound. A total of 66 bulls was examined, and of the 59 which were classified as "moderate" or "good" at the most only seven

could have been considered unsatisfactory by the farmer. It is not certain, of course, just how many of these seven were unsatisfactory purely because of the poor fertility of the bull himself. Of the seven bulls which the farmer was advised to treat as "unsatisfactory" or "sterile," two proved to be satisfactory in their mating results—which would emphasise Mr. Blake's point that a farmer would be wise to have "unsatisfactory" bulls examined again at a later date and to have a reserve bull on hand—and the other five warranted the decision given in their case.

Definite Value

It is perhaps unfortunate (purely from an experimental point of view!) that more "unsatisfactory" bulls were not available for classification by Mr. Blake, as it is in this section of the table that the numbers are rather small to permit of definite conclusions regarding the reliability of semen examination in revealing bulls of poor latent fertility.

On the results of the 66 classifications, however, only five (three "moderate" bulls below 41 per cent. and two "unsatisfactory" bulls above 50 per cent.) can rightly be regarded as errors of such a nature as to mislead the owner. Such an error (approximately 8 per cent.) should be regarded as highly satisfactory when considering the practical application of semen examination work, and if this degree of success can be secured when such work is carried out on a widespread scale at the start of mating it should be of very definite value in warning or reassuring the farmer concerning the probable influence of his bulls on the fertility of the herd.

Reference: *New Zealand Dairy Board Bulletin, "Herd Wastage Returns 1938/39 Season."



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Introduction of Clover into Tussock Country

Trial Laid Down in Central Otago

S. H. SAXBY, Instructor in Agriculture, Dunedin.

THE maintenance or improvement of Otago's large area of unploughable tussock country has for many years been the subject of much consideration and endeavour by farmers and others interested. The aspects of the question claiming most attention have been burning, climatic condition, and the regulation of stock numbers, whether these are sheep or rabbits.

In this article it is intended to discuss one other aspect which may have distinct possibilities, namely, the introduction of some useful leguminous plant or plants into certain districts where they are not already established.

The vegetation of New Zealand, and the tussock country of Otago in particular, was in its natural state singularly devoid of useful leguminous plants. In the tussock country practically the only leguminous plants present were—and in many parts still are—various species of *Carmichaelia*, or native broom, none of which is of any great agricultural value or significance.



On unploughable country such as this, where snow grass is, or was, the dominant tussock, the introduction of some leguminous plants may be of considerable value.

[S. H. Saxby, Photo.]

In the snow grass tussock country of Otago the Fields Division has laid down a trial to ascertain what plants of the clover family will establish under these conditions. Sixteen species of clover were sown in September, 1938, and although it is yet too early to form any conclusion, the progress report shows that certain perennial types are thriving.

Value of Clovers

The value of clovers and other closely allied plants is well recognised on most of the lower and ploughable high fertility country. It is thought

that if some such plant could be introduced and maintained in some of the unploughable tussock country a very useful purpose would be served.

In speaking of the tussock country in a general manner one refers to a vast area which shows great variation in climate and existing vegetation. For example, on the more coastal country where a comparatively high rainfall is experienced the natural vegetation has to a large extent been replaced by introduced plants which have come in as a result of different systems of management. Of these plants brown top, fescue, yorkshire fog, sweet vernal, some cocksfoot, dogstail, and ryegrass are the most common grasses, while white clover and suckling clover are fairly common.

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Stability Desired

This induced vegetation has in most cases been of a better value from the pastoralists' viewpoint than the original association of plants. It is not suggested that the former vegetation was not valuable. It was. But under hard grazing conditions it was not as stable as that association made up of introduced plants. One of the essentials of any unploughable grazing country is that it should be as nearly stable or permanent as possible, provided that it will feed the required stock in an adequate manner.

At the other extreme one has the inland tussock country under a continental climate, hot and dry in summer and wet and cold in winter. Here, with stocking by sheep and rabbits, the original vegetation has largely disappeared, and the country is now almost barren except for such comparatively useless plants as scabweed.

However, in between these two types of tussock country there is a large area which has altered to a much lesser extent. The original native plants are surviving, more or less,



A general view of the trial described in this article. Note the growth made inside the fence as the result of closing up for three months.

{S. H. Saxby, Photo.

and introduced plants have often gained only a slight hold and do not tend to become dominant. The chief change is that some of the more palatable native plants have been eaten out and have been replaced by less

palatable native plants, together with a smattering of introduced plants.

It is into this class of country that the introduction of some leguminous plant would appear to be warranted. Throughout this area, except in the

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more fertile valleys where cultivation and topdressing can be carried out, useful leguminous plants have often made little or no progress. Although it is difficult to define this belt of country because of variations in altitude, it is very roughly that country on which the snow grass tussock is or was one of the dominant plants.

Trial Laid Down

In order to ascertain the possibilities of introducing useful leguminous plants a small area on the property of Mr. R. M. Marshall, of Mowhiti, was selected as being reasonably typical of the country under consideration. Here a trial was laid down, the objects of which were two-fold—firstly, to ascertain what legumes would establish and survive under the existing conditions, and, secondly, to find out the treatment necessary to ensure that the sown species would not only survive, but would also thrive and increase. In this investigation are involved the questions of spelling and applications of various fertilisers.

With these objects in view plots of the following species were sown on September 21, 1938:—(1) White clover (certified mother seed); (2) white clover (ordinary commercial); (3)



Red clover established readily throughout the plot. Here it is seen establishing among a variety of tussock and other native plants. Other sown clovers, although not as conspicuous as this, also established freely.

[S. H. Saxby, Photo.]

white clover (Kentish); (4) Montgomery red clover; (5) *Lotus major*; (6) Alsike; (7) strawberry clover; (8) black medick; (9) subterranean clover (Mount Barker); (10) Subterranean clover (Tallarook); (11) subterranean clover (Dwalganup); (12) suckling clover; (13) *Lotus hispidus*; (14) Striated clover; (15) clustered clover; (16) haresfoot trefoil.

The seed was sown by hand and very lightly grubbed in. Subsequent observations suggest that the grubbing was unnecessary, as plants established equally well on parts that were missed with the grubber.

Types of Plants

It will be noticed that some of the plants sown are perennials, and some are annuals. In view of our existing knowledge with regard to the "natural" distribution of annual clovers in New Zealand, it is doubtful whether in Otago annual clovers other than suckling clover and haresfoot trefoil are likely to thrive. The reason for this statement is that as climatic conditions become increasingly severe they influence to an increasingly large extent the distribution of tender plants.

A number of annual clovers and allied species have become well established in the northern parts of New Zealand, but as one travels south both the number of these species and the frequency of their occurrence decreases. This fact alone would lead one to believe that the introduction

of annual legumes into the southern tussock country is not likely to be highly successful.

It would appear that the perennial are more likely to prove successful. In the country under consideration white clover is present in some parts but appears to be of a poor type. Other perennial clovers are absent.

Plots Topdressed

Carbonate of lime, burnt lime, and superphosphate have been applied in various quantities across all plots. The object of this has been, not to ascertain the economics of topdressing this country at the present time, but to find out whether or not these substances (lime and phosphate) are factors limiting the healthy growth and spread of clovers. In the event of a response from these being shown an investigation into the minimum quantities required would be necessary. Because of the cost of the material and the cost of its application it might be found advisable to sow a lower producing legume which does not require added fertility rather than aim at a high producing plant which cannot be maintained economically.

Up to the present time on the trial there has been a very marked response of most species to both lime and superphosphate, particularly with regard to the perennials. As the trial has been in progress for such a short time it is obvious that no conclusions can be

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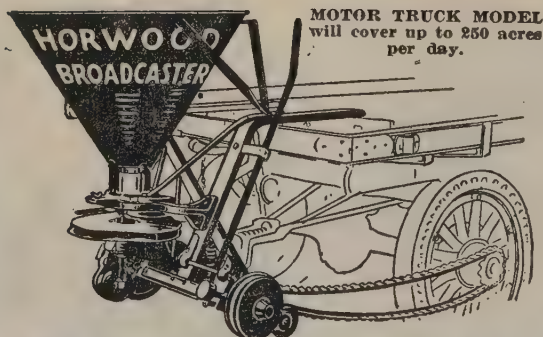
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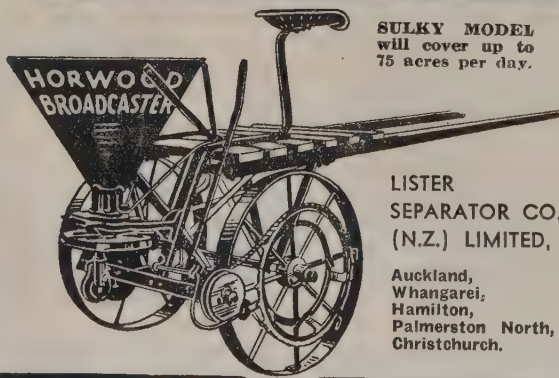
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arrived at as to the absolute value of any plants or their treatment, and it will be some time before any information of practical value can be obtained.

Progress of Trial

Nevertheless, a few remarks on the progress of the trial to date may be of interest.

Shortly after the trial was sown the area was ring fenced to exclude sheep in order that they would not concentrate on the sown area. The spelling also gave the young plants every chance to establish, thus allowing uncontrollable climatic conditions rather than human or controllable elements to be responsible for the progress or otherwise of the various sown plants.

Subsequent to the sowing excellent conditions for establishment were obtained. The spring was mild and early with ample rain which continued until the end of the year, after which conditions became very dry until late autumn. These conditions were entirely favourable for the growth and reseeded of the sown annual plants particularly.

Some interesting facts with regard to the annuals have come to light. All made a satisfactory initial strike, but later development varied greatly from species to species. *Lotus hispidus* struck fairly well, but at the end of the season had grown little more than in even in the shelter of the tussocks.



A general view of the plot (left) sown with white clover and (right) portion not sown with any clover. Photo taken 15 months after sowing. White clover has grown very well, especially where topdressed.

Subterranean clover has also been disappointing in that although the strike in each plot was quite good the plants were on the whole poorly developed and sickly in appearance. By the end of the summer the Dwalganup strain was practically non-existent. The other two strains were quite poor. Throughout the hill country of Otago the sowing of subterranean clover has not met with the success obtained on somewhat similar country in parts of the North Island.

Suckling clover was found to be present naturally throughout the area and the additional amount sown did not make a material addition.

Striated clover and clustered clover both struck well and grew to form

good-sized plants with a fair amount of useful herbage. Both of these died and reseeded before the first autumn frosts. Of the two striated clover has been the better with regard to both establishment and production.

Haresfoot trefoil, which is usually and rightly regarded as a comparatively worthless annual clover, established quite well, although rather slowly. Its subsequent production was quite good, although not very leafy. The majority of the plants flowered and reseeded before the autumn frosts but some were still green at the end of May.

Perennial Species

Of the perennial species black medick has been the only one to fail completely. Although generally regarded as a limestone country plant it was thought that it would be worth a trial.

White clover on the whole has done very well, particularly where it has been crossed with topdressing. Establishment and spread in the year was greater than anticipated. A small amount of volunteer white clover is present in parts, but it is apparently of a low producing type. Of the strains of white clover the certified type has spread in a more satisfactory manner than the "Kentish" or "ordinary." The latter two have, however, been better than any of the annuals.

Montgomery red clover established very well and after having a very yellow and unhealthy appearance for several months eventually settled down to its typical close growing dense crowned form. At the present time it is promising in appearance at least.

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Lotus major, like *Lotus hispidus*, established in a satisfactory manner, but few plants have grown more than 4 in in height. Present indications are that this plant is most unlikely to be of any value. A trial of a closely related plant, *Lotus corniculatus*, which is reputed to grow under dry conditions, may, however, give better results.

Alsyke, a plant suited to establishing under colder conditions than most other clovers, has done remarkably well with regard to both establishment and production. The test of this plant, however, will not come until it has been grazed for a season or two. Strawberry clover was included in the trial mainly as a matter of interest, as it usually grows best on saline country. In the trial, however, it has progressed in a satisfactory manner, but has not grown as well as the white clovers. Early frosts also affected it to a considerable extent.

It should be remembered that this trial has been designed to obtain information regarding the establishment and maintenance of useful leguminous plants on certain *unploughable* tussock country. On ploughable tussock country in the belt under discussion experience has shown that with liming and topdressing comparatively good swards can be established and maintained. There is, however, a large area where neither the plough nor the topdresser can be used, and it is here that some leguminous plant would be of great value if it could be introduced and maintained economically.

Results of Trial

Briefly, the results of the trial up to the present time indicate two things. Firstly, that the likelihood of maintaining a population of annual clovers is not likely to be as easy as is the case in the more Northern tussock lands. Secondly, that the maintenance of perennial legumes, such as white clover, is possible only when these are accompanied by lime and phosphate. The topdressing of hill country in parts of the North Island has proved to be economically possible. Whether this will be the case in the country under consideration remains to be seen.

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Sugar Beet For Pigs

Here Are Directions For Growing This Crop

Sugar beet is undoubtedly destined to play an extremely important part in this country in the production of pork and bacon. As shown in an article in last month's "Journal," sugar beet has established a superior feeding value to other root crops, and in this article a full description is given of how to grow a high-yielding crop. Sugar beet can be grown successfully wherever mangolds or carrots thrive.

TO farmers looking for something really good in the way of a root crop for wintering pigs, sugar beet is strongly recommended. The sugar beet is a deep-rooted, strong-growing plant, closely related to the mangold, but of very much higher feeding value. In good varieties of sugar beet the whole of the root is underground, the top growth is very strong and vigorous, and the crop thrives best on deep alluvial and fertile soils.

Sugar beet can be grown successfully, however, wherever mangolds or carrots thrive, and on most dairy farms a suitable area with a deep free draining fertile soil can be found on which to grow the crop. Sugar beet will not do well on soils with stiff clay at or near the surface; nor will it grow on peat soils where the peat is the main constituent of the soil. Sugar beet responds to good treatment, and small areas well manured and well cultivated are recommended rather than larger areas given little attention.



— By —

C. J. HAMBLYN,
Fields Superintendent,
Palmerston North,

Varieties

Unfortunately, because of the sudden restrictions on the importation of sugar beet seed from England the choice of varieties has been reduced to what we can get. For this season a variety known as "Kleinwanzleben" is the only one available.

The Department of Agriculture has had a number of varieties under trial, and roots of some varieties which have shown good results are being grown for seed production in this country. The sugar beet has been improved by selection to a considerable extent, and from the many types available it should be possible to ascertain by trials in various districts the most suitable types. In the meantime, it will be necessary to make use of the material at present in New Zealand for future stocks of seed.

Sugar beet does best, as the first crop after grass, but it can follow crops such as swedes or chou moellier

which have been fed off and also crops of peas and red clover, both of which add nitrogen to the soil.

Like mangolds, sugar beet is not attacked by insects, but it is more subject to the diseases mottled heart and crown rot. For this reason it is unwise to attempt more than two successive crops of sugar beet on the one area.



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Preparation Of the Land

Sugar beet is deep rooted. Where there is any tendency to a stiff sub-soil within six to eight inches of the surface, deep ploughing is recommended. As for other crops, the ploughing-out of grass should be done as early as possible, to allow the turf to rot before planting time. Excellent crops of sugar beet have been grown this season on deep and fertile soils by ploughing out of grass about mid-September and sowing the crop about mid-October. On these soils the turf breaks down readily, and although the ploughing was only 5 to 6 inches deep, the roots of the beet were able to penetrate easily up to 12 to 15 inches into the soil. These are ideal conditions.

To grow good crops under the more difficult conditions likely to be found on many farms, it is necessary either to skim-plough in the autumn or early winter or to disk the turf heavily, following this by deep ploughing in July or August.

After the ploughing the preparation of the seed bed is the same as for

mangolds or carrots. Sugar beet gives a good, quick germination when sown on a fine, moist and firm seed bed.

Manurial Treatment

Sugar beet is a gross feeder, and responds well to fertile conditions. Lime should be applied after ploughing at the rate of 5 to 10 cwt. per acre, as sugar beet requires a sweet soil. Well-rotted cow-yard or stable manure ploughed in will do much to supply the additional nitrogen which this crop requires for its strong growth of leaves.

Artificial manures for a first crop after grass on fertile soils can be confined to 5 to 6 cwt. per acre of superphosphate. Superphosphate and blood and bone would be better where no additional animal manure is available. Where soils are not so fertile, cow-yard or stable manure is a great help if ploughed in early. Where such manure is not used, a mixture containing readily available nitrogen in addition to the nitrogen in the blood and bone is recommended. A suitable mixture would be 3 cwt. super, 3 cwt. blood

and bone, and 1 cwt. of sulphate of ammonia per acre. In soils where potash has proved of value on the pastures or with the mangold crop the addition of 1 cwt. of 30 per cent. potash to the acre is advisable.

Sowing

The "seed" of sugar beet is similar to that of mangolds, more than one seed being present in each seed case, but the "seed" is somewhat smaller than that of mangolds. Early sowing is essential to good sugar content, and in the North Island October is the best month to sow, the earlier the better generally. Seeding is satisfactory at the rate of 4 to 5 lb. per acre if the seed bed is clean, fine, and firm. The seed should be sown at a depth of from $\frac{1}{2}$ in. to 1 in.

Seed may be sown either with the combined ridger and sower or with the grain drill on the flat. The advantages of the former method in the case of mangolds apply equally in the case of sugar beet. In either case the rows should be from 18 to 21 inches apart. Excellent crops were grown this year by sowing 4 to 5 lb. of seed per acre

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in 21in. drills with the ordinary grain drill.

Subsequent Cultivation

Horse or hand hoeing is essential in the early stages to keep down weeds. Sugar beet, however, produces a much stronger top growth than mangolds, and with a spacing of 18 to 21 inches between the rows the tops soon cover the ground and weeds are suppressed for the rest of the growing period, even in wet growing seasons. The rows should be hand-weeded and the plants singled to a spacing of 8 to 12 inches.

Because of the rapid growth of tops and the closer spacing, sugar beet requires generally less horse-hoeing and after-care than mangolds.

Yields

In general, the weight of roots per acre which can be expected with sugar beet will be about half that of mangolds grown on the same ground; but the actual amount of stock food produced by a 30-ton crop of sugar beet is considerably greater than that from a 60-ton crop of mangolds. The dry matter in sugar beet, which will vary from 23 to 26 per cent., is about 2½ times that of mangolds, which contain 10 to 11 per cent. of dry matter. In addition, the tops of sugar beet are

a very important part of the feed produced.

In April, May, and June the tops of a good crop will weigh from 23 to 30 tons per acre. The dry matter in these tops is about 14 to 16 per cent., and is considerably higher than the dry matter in the roots of such crops as carrots, mangolds, and swedes. The sugar-content of beet crops varies according to the variety, the soil, climatic conditions, and earliness of sowing. Crops grown during the past season showed a variation from 15 per

cent. of sugar up to 21 per cent. for one crop in the Manawatu.

Feed Value

A 30-ton crop of sugar beet with a dry matter analysis of 24 per cent. and a sugar-content of 18 per cent. is equal in feeding value to between six and seven tons of barley grain.

A number of crops in the Taranaki, Manawatu, and Hastings districts carefully weighed and sampled this year gave yields ranging from 25 tons of roots per acre for the lowest up to 49 tons for the best. The weight of tops in early June ranged from 20 tons to 30 tons per acre. The analysis varied from 20 per cent. up to 28 per cent. for dry matter, with from 15 per cent. to 21 per cent. of sugar.

While 10lb. of mangolds equals 1lb of barley, equals 1 feed unit, only 3 to 4lb. of sugar beet equals 1lb of barley, equals one feed unit.

Pigs have no difficulty in eating sufficient sugar beet to provide all the heating and fattening food required even in the coldest weather. It is for this reason that sugar beet is outstanding compared with other heavy-yielding root crops. Its much higher



Two well-grown roots of sugar beet.



A good crop of sugar beet grown at the Waimate West Demonstration Farm.

World Experience



in Every Gallon

yield per acre makes it a better crop to grow than artichokes or even potatoes, which compare with it in food value.

Using the Crop

Sugar beet can be fed with perfect safety to all sizes of pigs and at all stages of growth of the crop. There is no need to ripen the crop off, as is the case with mangolds.

In April, May, and June, when the tops form the major part of the crop, the sugar-content of the roots is quite high, and the tops are excellent fattening food, a fact which was well demonstrated this year in Hawke's Bay, where lines of bacon pigs were topped off on sugar beet alone in April and May when no milk whatever was available.

When the tops die down in late June or July the roots can be fed out from the paddock or they can be pulled and stacked in a convenient place in the open, where they will keep in good condition through the spring until October or even November. To keep the beet late into the spring, it is ad-

visable to cover the heaps with straw or hay to keep out the light, thus preventing fresh growth from the crowns.

One quarter of an acre of sugar beet for every sow will provide the bulk of the food required to winter the litters whether they are farrowed in January, February, and March, or even later. Sows with litters farrowed in May have been carried through in excellent condition on sugar beet and 1lb of meat-meal per day.

Fed on Grass

For best results, the sugar beet should be fed to the pigs on grass, and for this reason many farmers grow the crop on part of a cow paddock. The rest of the paddock is made pig-proof, and is used for feeding out the crop to the pigs. Each year the cropped area is re-sown to grass, while a fresh area is broken up. A suitable temporary pig shelter large enough to shelter the pigs for the winter is erected so that it will serve while this particular paddock is being used for the sugar-beet crop. Each succeeding year the pigs

have a fresh area of young grass, while the fertility of the rest of the paddock is built up by having the crop fed out on it.

Large numbers of store pigs have been wintered and even fattened with a minimum of losses where this method is adopted in place of carting the root crop to be fed out in muddy enclosures or in draughty styes.

Experiences Of Farmers

Here are brief details of some of the sugar beet crops grown by farmers and used with success this past year.

SOUTH TARANAKI.

Mr. A. W. Revell, Lower Duthie Road.
—Three-quarters of an acre of the variety "Kleinwanzelben" was grown on a medium volcanic loam ploughed out of old pasture in early October and sown in mid-November, using 6 lb. of seed in the 21 in. drills. The crop was Dutch-hoed twice, the plants being thinned to 10 to 12 inches apart. When weighed on June 10, 1940, the yield was: Leaves and roots, 76 tons 8cwt.; roots



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... I have been using your Q.E.D. Mammitis Drenches for two seasons. I am very pleased to be able to tell you that I have had very satisfactory results.—E.J.T., Wanganui.

... I have been using your Q.E.D. Drenches consistently this season and have been getting good results. I am now on the 9th dozen.—J. A. B., Morrinsville.

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only, 44 tons 15cwt. per acre. The analysis showed 16 per cent. of sugar and 24 per cent. dry matter. Mr. Revell is a pedigree pig breeder, and fed sugar beet to all classes of pigs, from sows with litters to strong stores. He states that sugar beet is definitely much superior to carrots or mangolds. He is extending his area of sugar beet next season.

Mr. J. W. Pollock, Denby Road, Hawera.—Mr. Pollock sowed four acres of light volcanic land to sugar beet. The land was ploughed in September after a crop of sugar beet and swedes, and 4lb of seed was drilled in mid-October in 21in. rows. The crop was horse-hoed four times and hand-thinned. When weighed on June 4, 1940, the yield was: Leaves and roots, 56 tons 16cwt.; roots only, 31 tons 2cwt. The sugar content was 16.1 per cent. The crop was fed to pigs and cows, and Mr. Pollock was very satisfied with the results of this, his second sugar beet crop, which he states gave better results than mangolds with his dairy herd.

Waimate West Demonstration Farm.—One acre of light volcanic land was ploughed out of pasture in September and sown to sugar beet at 5lb. per acre in 20in. drills in mid-October. Old seed was used and the crop failed, but was re-sown on December 8. The crop was horse-hoed twice and hand-thinned. When weighed on June 3 the crop gave a yield of: Leaves and roots, 64 tons per acre; roots only, 31 tons. The tops were still very strong and the roots not mature. This was the third crop grown at the farm and used with excellent results for wintering pigs in that 25 to 30 baconers have been turned off before the middle of November each year, and many as early as the second week in September.

Mr. A. Gamelin, Kaupokonui.—An area of 2½ acres of old pasture was ploughed in September and sown with 5lb. of sugar beet in 21 in. drills on October 20. The crop was horse-hoed



Pigs eagerly devouring sugar beet fed to them on grass.

twice and hand-thinned. Feeding out to pigs was started on May 10. The crop, when weighed on May 17, gave a yield of: Roots and leaves, 67 tons 16cwt; roots only, 39 tons 5cwt. This was an excellent crop, and at the time of weighing more than 100 pigs of all sizes were being fed entirely on sugar beet. Mr. Gamelin was confident that the bigger pigs would go away as baconers from time to time, and that the crop would see all the pigs through for at least three months.

Mr. E. R. Putt, Otakeho.—Three-quarters of an acre of old pasture was ploughed in September and sown in mid-October with 6lb. of sugar beet in 28 in. drills. The crop was horse-hoed three times and hand-thinned. When weighed on June 18 the yield was: Roots and leaves, 77 tons 5cwt; roots only, 48 tons 10cwt. The sugar content was 15.8 per cent. This was an excellent crop, and was used for wintering 70 pigs, the farmer being well satisfied with the way they were thriving on the sugar beet.

MANAWATU.

Mr. W. Moynihan, Shannon.—A crop of particular interest was grown by Mr. Moynihan on the fertile swamp land of that district. Three varieties, the seed of which was imported by the Shannon Dairy Co., were tried. All gave good yields. A crop of "Kleinwanzelben Z.Z.," gave a yield of 25

tons of roots with the exceptionally high sugar content of 21 per cent, and a dry matter average of 28 per cent. Three pounds of such a crop would be equal to or rather better than 1 lb. of barley in feeding value on a dry matter basis, and the 25 tons per acre crop was equal to about 8 tons of barley grain. A 46 bushel crop of barley gives only 1 ton of grain. A second area was sown with a Scottish selection of "Kleinwanzelben," which gave a yield of 27 tons of roots with a sugar-content of 20 per cent. and dry matter average of 25.57 per cent. A third crop of a "Kleinwanzelben" variety of the E type with very strong top growth gave a yield of 32 tons 15cwt. The sugar-content was 17.8 per cent. and the dry matter 23.18 per cent.

These crops serve to show that there is a considerable variation in the yield and analysis of sugar beet crops. Any of these crops, however, produced the equal to at least 8 tons of barley per acre. Mr. Moynihan is very satisfied with the value of sugar beet for pigs in the winter. A trial carried out on this farm showed that store pigs averaging about 100 lb. live weight put on more than 1 lb. of flesh per day for two months when fed on sugar beet, plus 1 lb. of meal per day.

Mr. S. W. Carter, Shannon.—Mr. Carter, a well-known pig producer, had four acres of sugar beet in 1939 and

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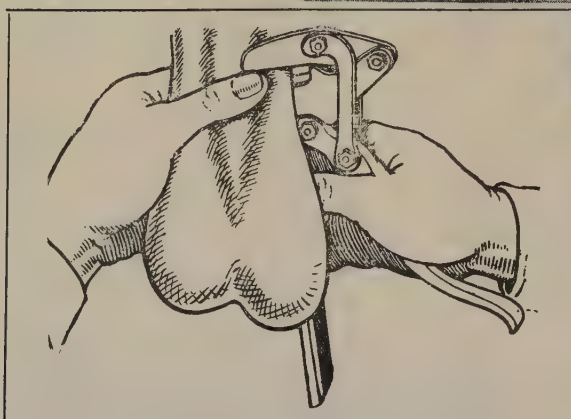
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three acres this season. He wishes he had more. On the three acres grown this year he is wintering 160 pigs of all sizes, and they are thriving. On

the free-draining silt where the crop is growing Mr. Carter turned the pigs straight on to the crop, and they have done their own digging, much as they

would do on an artichoke crop. This would not be done every winter; nor would it be safe on all kinds of soil. Mr. Carter freely admits that the pigs

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Ten pairs of twin half-bred male lambs were taken from a flock of Cheviot ewes. One twin was castrated with the castrator, the other with the knife. The live weight gain between castration and weaning was recorded for each lamb, and the gain made by one lamb castrated with the castrator compared with that of its brother castrated with the knife.

IN EVERY CASE, THE BLOODLESSLY CASTRATED LAMB MADE MORE RAPID GAINS, THE AVERAGE INCREASE BEING 59 lb., AS AGAINST AN AVERAGE OF 53 lb. FOR THOSE CUT WITH THE KNIFE, AN ADVANTAGE OF 6 lb. PER HEAD.

Seven single lambs castrated with the castrator averaged 64 lb. increase between castration and weaning, compared with an average of 58 lb. for seven cut with the knife; again an advantage of 6 lb. per head. In addition to yielding a heavier lamb, the bloodless castrator gave a bigger lamb with bolder head and stronger bone, and in better condition.



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would do better on the beet if it were fed out to them on a grass paddock and that the crop would go much further.

A number of other farmers in Taranaki and Manawatu have grown very good crops of sugar beet, but no opportunity has occurred to weigh and record the crops. Reports on the feeding value and the opinions of farmers are, however, good.

HAWKE'S BAY.

Some good crops were also seen at Hastings. In fact, the biggest sugar beet specimens yet observed were growing on a small holding near Havelock North. These roots would average 10 to 12 lb. each.

Mr. A. Anderson, Tomoana.—Mr. Anderson grew a heavy crop of excellent roots. When, through exceptionally dry weather, the milk yield went off suddenly in March he finished off a number of baconers to full weight on sugar beet in place of the milk they had been getting. Mr. Anderson rates sugar beet as the outstanding crop for pigs, and he has had years of experience with pumpkins, mangolds, carrots, and maize.

WAIRARAPA AND GISBORNE.

In both the Wairarapa and Gisborne districts good crops of sugar beet and very satisfactory feeding results have been reported, although no records are available of actual yields and the analysis of the roots.

Important Future

It is certain that in this country the sugar beet is destined to play an extremely important part in the production of pork and bacon, and that as the good results being obtained are passed on from farm to farm the use of the crop will become more general. It is interesting to note that recent reports from England show that in many counties where sugar beet is not grown for the sugar industry farmers are growing it extensively for stock food in place of other roots.

Pigs fed on sugar beet, especially when run on a grass paddock, are remarkably healthy, and stand up to the cold extremely well.

Slaughterings of Stock

THE following returns of slaughterings of stock at meat-export slaughterhouses and abattoirs for the three months, May, June and July, 1940, have been compiled by the Livestock Division:—

District	Cattle	Calves	Sheep	Of which Ewes were	Lambs	Swine
North Island						
Meat Export Slaughterhouses—						
Auckland	88,576	110,694	56,840	36,173	96,071	60,524
Poverty Bay - Hawkes Bay ..	41,334	10,533	115,422	50,377	126,219	7,351
Taranaki-Manawatu	52,184	27,332	65,429	40,549	137,974	38,867
Wairarapa-Wellington	25,059	2,833	49,342	27,059	89,232	7,877
Totals	202,153	151,392	286,533	154,158	449,496	114,619
Abattoirs	34,752	10,903	120,658	64,268	10,848	27,561
North Island Totals	236,905	162,295	407,191	218,426	460,344	142,180

South Island						
Meat Export Slaughterhouses—						
Nelson-Marlborough	1,210	17	26,537	12,276	51,271	2,481
Canterbury	4,837	4,403	214,410	176,567	321,593	6,482
Otago-Southland	5,998	167	156,335	131,230	587,701	1,794
Totals	12,045	4,587	397,282	320,073	960,565	10,757
Abattoirs	15,503	3,553	68,744	34,982	6,192	10,432
South Island Totals	27,548	8,140	466,026	355,055	966,757	21,189

Dominion						
Meat expt. Slaughterhouses	214,198	155,979	683,815	474,231	1,410,061	125,376
Abattoirs	50,255	14,456	189,402	99,250	17,040	37,993
Grand Totals	264,453	170,435	873,217	573,481	1,427,101	163,369
In addition the following stock were slaughtered at rural slaughterhouses for local consumption during the 3 months ended 30/6/40	18,886	614	57,474	Unknown	2,625	7,277
Same Period, 1939—						
Meat Export Slaughterhouses and Abattoirs ..	192,517	155,347	596,080	321,987	1,466,218	115,734
Rural slaughterhouses 3 months ended 30/6/39 ..	19,544	673	57,376	Unknown	2,926	7,259
Same Period, 1938						
Meat Export Slaughterhouses and Abattoirs ..	164,605	170,761	711,365	421,602	1,305,677	170,639
Rural slaughterhouses 3 months ended 30/6/38 ..	22,099	786	53,140	Unknown	2,648	7,859

Slaughterings of Pigs

The 12,852 pigs killed during July were distributed in weight ranges as follows:—

Under 60 lb.	124
61-100 lb.	6,200
101-120 lb.	1,795
121-160 lb.	2,365
161-180 lb.	483
Over 180 lb.	393
Sundries	1,492
101-120 lb.	..
121-160 lb.	..
161-180 lb.	..

The grading of pork is 76 per cent. primes and 24 per cent. second quality; and of bacon 74 per cent., 19 per cent. and 7 per cent. of prime 1's, prime 2's, and second quality respectively.

In the different weight ranges of baconers the grading is as follows:—

84%, 12%, 4% of P1, P2 and seconds.
71%, 22%, 7% of P1, P2 and seconds.
55%, 32%, 13% of P1, P2 and seconds.

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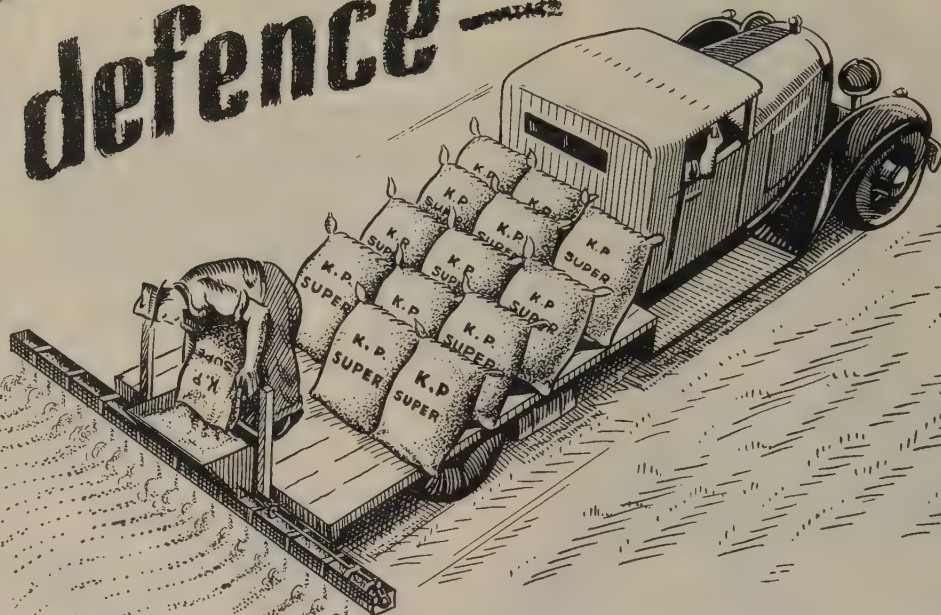
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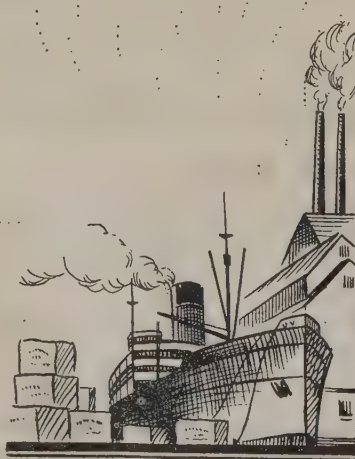
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Wheat in the Rangitikei

Tainui Is Considered Worthy of a Trial

UNDER the stimulus of wartime necessity a revival of interest in the growing of wheat has become evident in those North Island districts where formerly this crop figured much more prominently than it does today, and it would seem that the rapid and substantial decline in wheat acreage

able source of farming income than the growing of grain.

District Conditions

Success with such crops is largely dependent upon general soil and seasonal climatic conditions of the district concerned, and the wheat belt of the Rangitikei is characterised by somewhat heavy, rich loam soils, retentive of water, and by winter climatic conditions that are often prolonged. With the soil apt to lie wet in the winter and well into early spring, winter sowing is generally precluded and spring sowings often delayed until mid-October.

Such late sowings lead to a comparatively short growing season, and unless a suitable early maturing variety of wheat is grown it is likely to carry over the ripening into an unfavourable harvesting period. Moreover, throughout the summer and early

In common with other North Island districts, the Rangitikei has experienced a revival of interest in wheat growing. This article describes several varieties, and while Jumbuck is popular as the standard one, it is considered that

Tainui is worthy of a trial, as it has received very favourable comment from local growers who have grown it on a field scale in comparison with Jumbuck.

— By —

A. R. DINGWALL,
Instructor in Agriculture,
Wanganui.

which had been continuing since 1934 and was especially marked in the West Coast areas has now been successfully arrested. This decline in wheat growing in the Rangitikei district may be largely attributed to the increasing popularity of fat lamb production as being a more dependable and profit-

autumn months this coastal area is not infrequently subjected to strong and boisterous winds, which are not in the best interests of grain growing and harvesting. Thus, for wheat growing, the soil and climatic conditions of the district call for a spring-sown variety with a short seasonal growth that will permit late sowings when winter conditions are prolonged. Similarly, resistance to "lodging" and "shaking" would be particular attributes of a suitable variety.

Jumbuck the Standard Variety

It is the former attribute—that is, early maturity—which has doubtless led to the adoption of Jumbuck as the standard variety for Rangitikei, and the choice has undoubtedly been wisely made, for this variety, more so than any other standard variety of the past, has given fairly reliable and high yields of good quality grain over a number of seasons under the soil and climatic conditions peculiar to the locality concerned.

Nevertheless, Jumbuck is not without its drawbacks. The two most serious are: Firstly, the tendency to develop heavy, soft straw, especially if grown on the heavier, richer soil types and after a root or green fodder crop which has been "folded," thus rendering it liable to excessive lodging; and secondly, its susceptibility to "shaking" both in the field and out of the stook. Thus, in an unfavourable season many a promising crop finally proves most disappointing as a result of the general effects of weather conditions, and particularly of the strong coastal winds, which often

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cause serious "lodging" of the crop and "shaking" of the grain.

Within recent years a series of experimental and field trials have been conducted in collaboration with Messrs. G. L. Marshall and Alec Stuart, two well-known and experienced Rangitikei wheat growers, to determine whether some other introduced or specially selected variety would respond, under district environments, with consistent and reliably high yields of good quality grain without the risk of "lodging" and shaking so prevalently shown by the present standard variety. To fit in with the district conditions and requirements, any such variety would, of course, have to combine these two desirable attributes with short seasonal growth (early maturity), permit late spring sowing in unfavourable seasons, and exhibit high yielding potentialities.

Cross 7

Cross 7 was one of the first varieties tried, in view of its success in the South Island, where since 1936 it has

been rapidly displacing large acreages of Tuscan and some areas of Hunters and Jumbuck. This variety is particularly noted for its stiff, stout straw and immunity to "lodging" and comparative tightness of grain in the ear, which, associated with satisfactory yields of good quality grain, appeared to indicate reasonable possibilities of success in the Rangitikei.

Unfortunately, Cross 7 has not proved successful when spring-sown in the Rangitikei, mainly because of its long seasonal growth and lateness in reaching maturity, for it would seem that to reach the stage of ripeness during a favourable harvesting period and without unduly prolonging this period Cross 7 would have to be sown either very early in the spring or else in the winter. As previously indicated, these procedures are not always possible in the district concerned.

Thus, while this variety has always stood without the slightest signs of "lodging" and suffered little from "shaking," it has generally been out-yielded by Jumbuck and has taken several weeks longer to mature. As

a winter-sown variety it has shown decided promise, which was borne out by a crop sown in May, 1939, following failure of swedes. This crop survived the prolonged and wet winter of that year and revived in spring, to provide a thick, even stand which was harvested during the first week of January, and yielded approximately 50 bushels per acre.

Tainui

As a good yielding, early maturing, spring-sown wheat and one that is less susceptible to lodging and shaking than Jumbuck, the recently-introduced variety Tainui has so far shown a very favourable comparison with the standard variety in both experimental and field trials. Tainui was selected by the Wheat Research Institute, Christchurch, following five years of experimental field trials and grain quality tests with pure lines of wheat from supplies of seed from several overseas countries.

This variety was first included in experimental trials in the Rangitikei in the 1937-38 season, when it proved



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quite promising, although not outstanding in comparison with both Cross 7 and Jumbuck. The following season it was again included in variety trials along with Jumbuck, Cross 7, and several other introduced varieties, and was also extended to field scale trials in an area adjacent to a crop of Cross 7. In the former, Tainui again showed promise, being early maturing, reasonably resistant to "lodging," and very immune to "shaking," and in the field trials yielded 38 bushels per acre compared with 30 bushels for the adjacent Cross 7 crop, and a yield which compared favourably with the average for Jumbuck in that season.

During the past season further opportunities were afforded for comparison, particularly between Tainui and Jumbuck, both in experimental and extended field trials. The prolonged wet winter of 1939 delayed spring sowings throughout the district, and although the remaining spring and summer proved quite favourable for wheat growth, occasional rains and frequent strong and boisterous winds at and about harvesting subjected most crops to a severe buffeting both in the field and in the stook.

In the experimental trial conducted on the property of Mr. G. L. Marshall, "Greenbank," Turakina, both Tainui and Cross 7 gave significantly higher yields than Jumbuck, there being an improvement of 11 bushels per acre for Tainui and 6 bushels for Cross 7. Jumbuck suffered very severe loss through "shaking," which affected the other two varieties but slightly. Comparisons on a field scale between Jumbuck and Tainui were also possible on the same property, where one crop in particular furnished an outstanding illustration of the resistance of Tainui to "shaking."

This particular crop of Tainui, which was sown early in October with once-

grown Rangitikei seed and on land that had grown a 30-bushel crop of Cross 7 the previous season, established and developed well, and was ready for harvesting at the end of January. On or about February 2 unsettled weather accompanied by strong winds was forecast. It was therefore decided to "bind" the crop if possible before the onset of the winds, but part of the crop still remained uncut when the predicted gales began on the following day and continued unabated over the weekend with exceptional severity. Although this part of a fully-matured crop was severely buffeted for two days and strong winds were still prevalent when the crop was inspected on the third day, the wheat was still standing reasonably well, although with a decided lean, and evidence of "shaking" was practically nil, there being but a few odd grains apparent on the ground.

The yield of this crop when threshed from the stack in early April was close on 50 bushels per acre. Another 15-acre crop of Tainui on the same property, sown after rape and in a field adjacent to the winter-sown crop of Cross 7 mentioned previously, averaged 40 bushels per acre, although the average was lowered to some extent by two or three acres of the crop in a low-lying section of the field becoming heavily invaded with weeds. An area of Jumbuck under very similar soil conditions, but sown 10 days earlier than the Tainui, yielded 39 bushels per acre.

One further 16-acre crop of Tainui was sown during the last week of September on strong loam soil on the property of Mr. Alec Stuart, Heaton Park. It was seeded down at the rate of 2½ to 3 bushels per acre and at the same time as an adjacent area of Jumbuck. The Tainui developed into an exceptionally strong, even

stand, which remained free of weeds and disease infection and was cut and stooked during the third week of January.

This crop gave no evidence of "lodging" or "shaking," and at harvesting the light straw and full ears resulted in compact, heavy sheaves, which facilitated stooking and indicated high yields. When threshed, this crop provided the exceptionally pleasing and high yield of 71 bushels per acre, an improvement of 8 bushels per acre on the adjacent Jumbuck crop. Another field of Jumbuck on the same property which was harvested several days later than the Tainui "shook" badly both before cutting and when in stook, and yielded 56 bushels per acre.

Summary

Summarising the evidence to date, it might be said that Cross 7 as a spring-sown crop does not compare favourably with the standard variety Jumbuck because of its slow development, although it is markedly superior to the latter in respect of resistance to "lodging" and "shaking." Cross 7, however, does show promise as a winter-sown variety, although this practice is the exception rather than the rule in the Rangitikei district.

Tainui shows every promise of proving a most satisfactory spring wheat for the district, and has compared favourably, if not more than favourably, with Jumbuck both for yield and early maturity. Moreover, Tainui has proved more resistant to "lodging" and very much more resistant to "shaking" than the standard variety, and thus overcomes to a material extent two of the most serious weaknesses of Jumbuck. Jumbuck's vigorous growth and great bulk of soft straw, particularly on the richer soil types or following root crops that

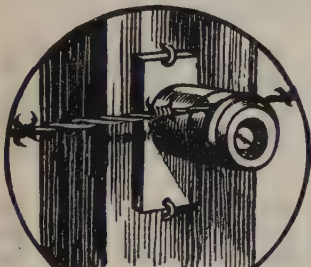
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have been heavily manured or fed off with high stock concentration, renders it liable to serious lodging, and the looseness of the grain in the ear frequently results in serious loss through "shaking" and consequently lowers yields at harvesting.

The soil and climatic conditions of the main wheat-growing areas of the district favour a spring-sown, quickly-maturing type of wheat, for much of the soil lies very wet in the winter and often late into the spring. Thus, while local growers mostly consider late August to early September the best time for spring-sowing, seasonal conditions often make sowing impossible before October.

The fact that Jumbuck can be successfully sown late in the spring has been one of the strongest points favouring its local popularity during past years. It would seem that Tainui is its equal in this respect, and by virtue of other distinct advantages promises to go a long way towards replacing the standard variety, especially if Tainui can maintain its purity and consistency in yield under local conditions over a period of years.

Tainui is by all means worthy of a trial by local growers, and has so far received very favourable comment from those Rangitikei growers who have already tried it out on a field scale in comparison with Jumbuck.

In submitting this review, I have to thank Messrs. G. L. Marshall, Turakina, and Alec Stuart, Marton, on whose properties the various experimental and field scale trials have been carried out, and whose comments and opinions based on long experience in wheat growing have been of the greatest assistance.

Record Yield of Wheat Report of Wheat Research Institute.

IN May, 1939, a Southland newspaper recorded that a field of $7\frac{1}{2}$ acres belonging to Mr. J. Grant, of Otautau, Southland, had yielded 112 bushels per acre.

Yields of over 90 bushels per acre are occasionally reported, but this yield of 112 bushels was so exceptional that it was thought worth while attempting to verify it. By the kindness of successive Fields Superinten-

dents of the Department of Agriculture in Dunedin the verification became possible. The evidence is as follows:—

(a) Letter from Mr. J. W. Woodcock, Fields Superintendent, Dunedin, 21/8/39, enclosing:—"Copy: J. Grant's wheat was threshed by me on April 4, 1939. Quantity: 246 sacks firsts, 6 sacks seconds. Total: 840 bushels. Area from which cut: $7\frac{1}{2}$ acres.—David F. Clark, threshing mill owner."

(The New Zealand sack contains $3\frac{1}{2}$ bushels.)

(b) Letter from Mr. J. M. Smith, Fields Superintendent, Dunedin, 7/6/39, enclosing:—"Copy: I wish to advise that Mr. Harbord and I checked up the area of Mr. Grant's wheat field, which is still in stubble. The field has a length of 14.81 chains and a width of 5.08 chains.—A. Stuart, Fields Instructor, Department of Agriculture, Invercargill."

The area given above works out at 7.5184 acres, and the yield is therefore 111.7 bushels per acre or, say, 112, as reported. The variety was Cross 7.



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Carrots for Supplementary Feed

Methods of Cultivation Adopted By Successful Farmers

IN recent years many farmers in the Eastern Bay of Plenty have been paying more and more attention to the growing of carrots as a means of supplementing the winter ration of dairy herds and wintered pigs. This is not so much due to the very general but erroneous idea that carrots possess a far superior feeding value to other root crops, but rather to the ever-increasing difficulty experienced in the production of satisfactory yields of swedes and turnips because of the prevalence of disease and the ravages of insect pests, such as the diamond-backed moth and the white butterfly.

In these circumstances, therefore, it is not surprising to find a decided swing away from a once popular practice to one that promised a more certain crop, although, perhaps, at the price of a little extra work and some additional cost.

Of all the successful carrot growers in the district covered by this article it is probable that Messrs. Cannell Bros., Te Teko, are without a peer.

Part of New Zealand's Fourteen Point Agricultural Plan is the growing of additional areas of supplementary forage crops. Carrots offer a profitable avenue in this plan, and the procedure followed by outstandingly successful Bay of Plenty farmers is described in this article in the hope that it may assist farmers who are considering growing such a crop.

These farmers have been growing from five to ten acres of carrots for many years, and their experience is recorded below for the sake of those who have either found difficulty in carrot growing in the past or who plan to attempt a crop in the near future.

Thorough Cultivation

In the first place, thorough cultivation of the land before seeding is insisted upon, as it is recognised that no seed can possibly produce plants capable of a high yield unless conditions for vigorous growth are provided—and adequate cultivation is definitely one of these essential conditions. Very

rarely, if at all, are carrots grown in the same ground twice in succession, as it is found that weeds are

difficult to contend with in the second year and insect pests frequently spoil a considerable part of the crop.

A fresh piece of grassland is, therefore, always selected, and before ploughing it is well to chop it up with the discs so that the furrow slices readily fall to pieces when turned over. Such a practice has many advantages, not least among which being the speedy decomposition of the turf and the ease with which a good tilth can be secured.

Weed Control

Following the plough comes the roller, as the soil on Messrs. Cannell Bros.' farm is rather light and requires consolidation for best results. The discs and harrows then play their respective parts, and once again the land is rolled (see Fig. 2, left of illustration). The next operation is that of ridging with the moulding plough, the ridges being spaced 27 inches apart to allow inter-row cultivation with a

— By —

C. R. TAYLOR,
Fields Instructor,
Whakatane.

Photo above:

The reward for work well and conscientiously carried out. A 30-ton crop of carrots good for both dairy cows and pigs.

horse and cultivator. To many farmers 27-inch rows may seem a waste of valuable land, but actually it is far from being so because of the fact that weed control is so simplified that there is no excuse for neglecting to deal with this problem.

More carrot crops come to nothing as the result of weed competition than from any other cause, and when rows are spaced 7 inches or 14 inches apart the work of weeding calls for hand manipulation, which is both arduous and costly. Consequently, the job is frequently neglected, and the crop suffers accordingly. Yields of 33 tons have been secured from 27-inch rows without very much trouble apart from a planned routine.

Manuring

After the initial ridging (see Fig. 3, right of illustration) the area is manured. There is absolutely no stinting of fertilisers, for it is rightly contended that crops need feeding if they are to produce good yields. Hence, instead of the usual 3 to 4 cwt. of fertiliser used by most farmers to boost along a crop of roots, Messrs. Cannell Bros. have found it profitable to use

up to $\frac{1}{2}$ -ton of a complete manure per acre.

The mixture they employ is as follows:—

Superphosphate	3 bags
Blood and bone	1 bag
Bonedust	1 bag
Potash	1 bag

The manure is applied to the ridged land with the aid of the ordinary grass-land topdresser. Without knowing more than this, this practice may seem foolish, as it would appear that fertiliser is being placed anywhere but where most required—that is, within reasonable reach of the seed. However, the first ridging and the later manuring is only half the job, for the next operation is to split the ridges with the moulding plough to form an entirely new series (see Fig. 3).

In this way the outside of the original ridge which received most of the fertiliser now becomes the inside of the new series of ridges with the fertiliser correctly placed and extending down into the soil to a depth of 8 or 9 inches. The carrot is thus encouraged to penetrate deeply the well-fertilised soil and not to fork and

develop a miserable root by ever seeking the shallow-placed fertiliser so commonly the outcome of drilling manure.

Consolidation

The next step is to roll and consolidate the roughly formed ridge (Fig. 4). This is necessary, especially on light land, to facilitate the even growing of the seed and to ensure maximum germination. Although the machine illustrated rolls the ridge for the first time, sows the seed and rolls it all in the one operation, it is not really necessary to have such a piece of equipment. A good heavy strainer post with the corners chipped to form a roller and an iron bolt driven into each end to act as an axle will be found admirable for the purpose. Such an improvised roller will satisfactorily roll two ridges at a time, drawn by a horse walking between them.

The seed may then be sown fairly quickly with a planet junior as shown in Fig. 5, and another rolling should then be given to ensure optimum results. A sowing of 2 lb. of seed per acre has been found ample when sown under the conditions described.

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Fig. 1.—The moulding plough with which ridging is undertaken. The topdresser is used to manure the area following the initial ridging.



Fig. 2.—The land on the left is thoroughly worked and in good condition for initial ridging, as shown on the right. The ridges are spaced 27 inches apart to allow efficient weed control and moisture conservation by means of the cultivator.



Fig. 3.—Following the initial ridging, manure is applied with the grass topdresser. The ridges are then split with the moulding plough to form a new series, thus placing the fertiliser inside instead of outside the ridges. This picture illustrates the method of ridge-splitting after manuring.



Fig. 4.—Rolling the finished ridges to consolidate them and to prevent the seed from being sown too deeply. Seeding is also done with the machine shown at the same time.



Fig. 5.—If preferred or if necessary, seed may be sown with the planet junior as shown. In this case some sort of light roller is required to consolidate the ridges before and after seeding.



Fig. 6.—The completed job. A section of the new pampas plantation can be seen in the right-hand top corner.

It has been mentioned previously that more carrot crops are ruined from lack of weed control, especially in the early stages, than from any other cause. Realising this, Messrs. Cannell Bros. get quickly to work on weeds by starting their first attack on them when they are in the second leaf. From then onwards inter-row cultivation is both regular and thorough, and concludes only when further work would unduly damage the carrot plants without materially adding to the discomfort of their competitors.

Thinning of the young carrot plants is also attended to in the initial stages of inter-row cultivation, and with a little experience this task is quickly accomplished. After that, the only hand labour required is an occasional weeding between the plants.

Sowing the Seed

The seed is generally sown towards the end of October or early November, as it is found that the soil is sufficiently warm and moist at this time to enable the young seedlings to get a good start. To this end, ploughing is started about a month before. Earlier ploughing to provide a long fallow is not

favoured because of weed trouble and the leaching effect of winter rains. On heavier soils, however, it may be advantageous to provide for a long fallow, but it is doubtful whether the Eastern Bay of Plenty possesses any of this type of land.

From what has been written carrot culture may appear at first sight to involve a good deal of work, but actually it is no more than a high yielding crop deserves. Moreover, much of the cost connected with cultivation—and this is the main item—can rightly be debited against a subsequent crop, whether it be pasture, cereal, or anything else. This point should not be overlooked, for it frequently happens that crops following a well-attended root crop such as described do measurably better than one not so favoured as regards the history of its predecessor.

Thus, taking the long view, it is sound economy to give the carrot crop the care it demands, for not only is the immediate reward worth having, but that to follow is equally desirable.

Summarised Procedure

Summarised the procedure adopted by Messrs. Cannell Bros. for carrot growing, which can be thoroughly recommended to farmers both in the Eastern Bay of Plenty and elsewhere, is as follows:—

- (1) Select a suitable piece of grass-land. Chop it up thoroughly with the discs, and then plough to a depth of 4 to 5 inches.
- (2) Roll the furrow if possible, and then work down to fine tilth with discs and harrows.
- (3) Prepare ridges 27 inches apart with moulding plough.
- (4) Distribute manure over the ridges either with the topdresser or by hand, depending on the size of the area.
- (5) Split the ridges with the moulding plough in order to place the manure correctly. Merely sowing manure with seed does not do this.
- (6) Roll the ridges to consolidate them and to ensure an even depth of seed and maximum germination.

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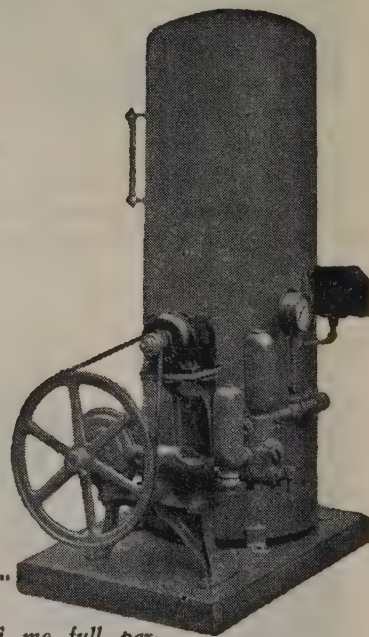
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(7) Sow the seed, not too deeply, and roll again.

(8) Attend to weeds by inter-row cultivation as soon as second leaf appears. Continue this work at regular intervals until the carrots are too large or the need for the work no longer exists.

(9) Thin the carrots in the row when an inch or two high, and deal with weeds where the cultivator cannot reach. Repeat as necessary.

(10) Sow the seed towards the end of October or early November in climates similar to the Bay of Plenty; a little later in colder climates. A sowing of 2 lb. per acre is ample.

(11) Manuring should be generous, particularly on the less fertile soil types. On better class land 6 to 7 cwt. of mixed fertiliser should be sufficient.

(12) Remember that there are no short cuts to success. Stinting of cultivation, labour, or manure will not produce results.

The Dairy Supply Control Order

A. E. MORRISON, Solicitor, Department of Agriculture.

UNDER the Dairy Supply Control Order, 1940, which came into force on August 19, occupiers of farm dairies affected by the Order and their successors in occupation are required to carry on the same form of production as that which was produced on the farm dairy and supplied for the manufacture of cheese or creamery butter during the 1939/40 season.

The Order was made by the Minister of Agriculture, the Hon. W. Lee Martin, under the powers conferred on him by the Primary Industries Emergency Regulations, 1939, as a step towards securing the additional quantity of cheese this season in accordance with the undertaking given by the New Zealand Government to the United Kingdom Government to produce and supply at least 15,000 tons more cheese than the quantity supplied last season.

The effect of the Order is to:—

(a) Tie the milk supply from farm dairies to those cheese factories to which the milk supply was delivered during the 1939/40 season.

(b) Prohibit the transfer of supplies from cheese factories.

(c) Tie the milk or cream supply from farm dairies to those creamery-butter factories to which the milk or cream supply was delivered during the 1939-40 season, and which have lost or may lose by transfer to cheese factories more than 2½ per cent. of the supply (computed on a butterfat basis) that was delivered to such creamery-butter factories during the 1939/40 season.

(d) Prohibit the transfer of supplies from such creamery-butter factories

except transfers of supply to cheese factories.

Provision is made for exemptions from the operation of the Order in proper cases by the Director of the Dairy Division of the Department of Agriculture or by the Assistant Director of that Division in respect of suppliers to cheese factories, and by Sir Francis Frazer, Deputy Chairman of the Executive Commission of Agriculture, in respect of suppliers to creamery-butter factories to which the Order applies.

Johne's Disease

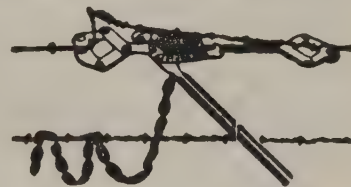
THE position in regard to the control of Johne's disease is not satisfactory from several points of view, states the annual report of the Director of the Livestock Division. Owing to conflicting results in the use of Johnin as a diagnostic agent, systematic testing of herds has been to an extent discontinued, and affected animals are removed from herds on a clinical diagnosis of the disease. Forty animals were condemned on Taranaki farms during the last financial year, cases being recorded from some new farms in this district. Fortunately, the majority of the herds in which the disease has been found are grade herds, so that the cull cows are sold to the works.

The greatest danger of spread of the disease is through the sale of pedigree stock in the early stages of infection. No doubt the disease was introduced in imported pedigree stock in the first place.

In place of the half-yearly tests of herds a systematic clinical inspection of the herds in Taranaki is being carried out.

In the Auckland district a total of forty-two head of stock have been condemned for Johne's disease during the year. It is satisfactory to record that all animals which passed the test prior to a recent dispersal sale of an infected herd have remained healthy.

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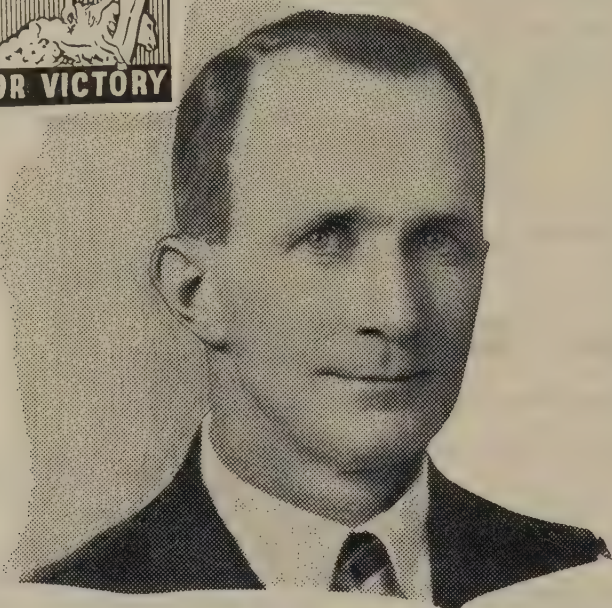
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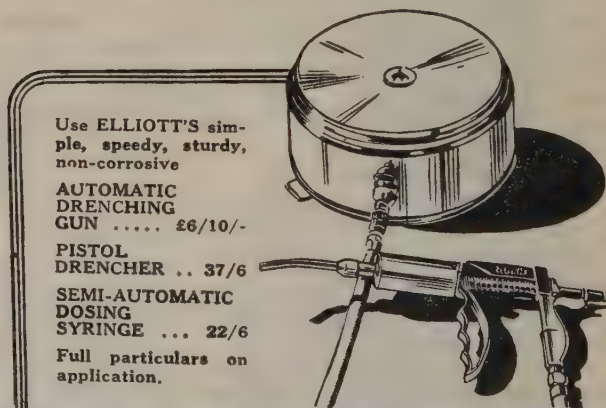
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Problem of Bloat in Dairy Cattle

EACH spring many dairy farmers are confronted with the problem of the prevention of bloat in their dairy cows and the treatment of the animals which become affected when grazing on the young, succulent, spring pastures.

More trouble is experienced in some districts than in others, and again much depends upon the season and the rapidity of growth of the spring pastures. Generally speaking, the softer and more succulent the nature of the feed, the greater is the tendency for stock to eat it greedily when hungry, and the risk of bloat in such circumstances is greatly increased. With more clover in the pasture, the greater tendency to bloat is usually recognised.

However, as it is important that a high-quality pasture consisting of good grasses and clover must be provided in order to ensure maximum milk production in dairy stock, the possibility of bloat occurring must be recognised, and steps must be taken to prevent it as far as possible and to deal with actual cases as they arise on the farm.

Management Important

Any discussion on the steps to be taken mainly resolves itself into a question of stock management and pasture management designed to reduce the risk to the lowest point consistent with adequate feeding to maintain maximum production. The actual practice followed on each farm to obtain this end is essentially a matter for the farmer to consider according to the feed supply at his disposal.

A few of the more glaring pitfalls might be mentioned so that they may be avoided, as well as some practices which appear to have given satisfaction in prevention.

Dealing with the predisposing causes leading up to an increase in the number of animals affected with bloat in any particular season, it is recognised that seldom does one ever see an animal bloated when it is continually at pasture. As an example, take the case of the fattening steer on the rich alluvial flats. This class of animal, even grazing on rich clovery pastures, seldom becomes blown unless a sudden change of pasture is encountered.

The inference to be drawn is that the dairy cow, which is in the shed twice daily for milking purposes and is sub-

jected to yard conditions, is hungry on returning to pasture and eats greedily to make up for lost time. The result is the ingestion of a considerable volume of a highly-fermentable food-stuff, resulting in the formation of an excessive volume of gas, which is not so quickly removed by belching, as occurs when the fattening steer feeds and ruminates intermittently throughout the day.

Preventive Measure

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fore the morning milking, the hunger position is aggravated and the position is liable to be worse. In such cases many owners have claimed results through the provision of hay in a rack in or about the milking yard. Many cows will eat hay provided in this way, although they refuse to eat it in the paddock.

The consumption of even a small quantity of hay appears to have direct preventive properties. The extra fibre provided in this way prevents the formation of a solid fermenting mass in the paunch, and thus assists the animal in getting rid of the formed gas through the usual channel.

Another preventive measure consists of avoiding the most dangerous paddocks when the cows are hungry or when the pasture is wet. This may be difficult, as all paddocks may be equally liable to bring about bloat. In such a case the most mature grazing should be used, and a careful watch maintained over the animals.

Bloat is less liable to occur in a district where the dairy herds have win-

tered well than in a district where feed has been scarce and the cows have suffered accordingly. The well-wintered animal has better tone in the walls of the paunch, and although fermentation does take place, the removal of the gas does not present the same difficulty as in the case of the impoverished animal.

Treatment

When an animal becomes affected with bloat the nature of the treatment will depend to a large extent upon the urgency of the measures required to deal with the position. In partly-blown animals, removal from the pasture, together with some walking exercise, may be all that is necessary to relieve the affected stock. In acutely-blown cows, where there is a danger of collapse and suffocation, the puncture of the left flank with a trocar and cannula may be the only course possible to save the affected animal.

The trocar is directed downwards, inwards, and forwards, the site of the puncture being a point midway between the last rib and the prominent

outer angle of the hip bone, a few inches below the transverse processes of the spine in the left flank region. It is generally quite safe to use the highest point of the blown left flank, as already described.

If a trocar is not available an incision may be made with a surgical knife, but in the absence of a cannula or tube to allow the escape of gas some of the contents of the paunch frequently escape through the opening, which is liable to result in abscess formation at a later date.

In the intermediate type of blown animal various means have been used to assist in the removal of the offending gas. The experienced owner may be able to pass a stomach tube through the mouth, thus releasing the gas. The insertion of a mouth gag, causing salivation, frequently assists in the eructation of gas.

In this type of bloating recourse to drenching is frequently considered. Good results are sometimes obtained by giving fairly large doses of baking soda. A quarter of a pound of baking soda dissolved in a quart of cold water



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may be given, and repeated as found necessary.

Another drench commonly used may be prepared by mixing 2 oz. of pure oil of turpentine in a pint of raw linseed oil. If the affected animal has been punctured through the flank and the cannula is still in position the drench may be poured direct into the paunch, using a funnel and small piece of rubber tubing.

Castration Of Ruptured Pigs

THE castration of ruptured pigs frequently requires attention on the farm where any number of sows are kept and where young litters require to be fixed up. One or two of the pigs in a litter may be affected, and it is not rare to find quite a number of affected pigs in particular litters. It is held that the tendency to rupture is an inherited weakness in certain strains, and the evidence tends to support this view.

The fact of the rupture being present allows a portion of the abdominal contents to pass down into the scrotum in addition to the testicle. This accounts for the size of the swelling,

which fortunately is frequently one-sided.

How to Operate

Castration is carried out on the following lines:

The pig is held up by the hind legs so that the abdominal contents of the sac may fall back into the abdomen. Strict cleanliness must be observed, and it is advisable to paint the purse with tincture of iodine and allow it to dry. Remove the testicle on the sound side, making the smallest possible wound in the skin of the purse. Then bring the other testicle hard up against the partition which divides the purse and release it through a small nick made in the partition, after which it will be removed through the original skin wound in the usual way. Allow the stump of the cord to slip back to its own side. Close the wound in the skin with two or three stitches, and paint with balsam.

The hands must be quite clean, and the knife, needles, and silk sterilised.

Calves Eating Bark Of Puriri Tree

M.A. (WAIUKU):—

In my calf paddock are a number of puriri trees, and every year the young calves eat the bark off the trees for as far up as they can reach, but after they are weaned and put in another paddock they do not bother about it at all. Have the calves some mineral deficiency which they seek in puriri bark and what would it be, and, if so, what could I give them to counteract this? Also, could you please give me some information about scour in calves—what causes it, and a cure for it if there is any?

Could you also please tell me what are small lumps which come up on store pigs' legs, but which do not come to a head and break or make a sore, and do not seem to affect the pigs much, but do not seem to get any better. Is there any cure for this?

LIVESTOCK DIVISION:—

It is not likely that the calves are receiving any mineral or other medicinal agent from the bark of the puriri trees growing in the calf paddock. The most likely explanation of the calves eating the bark of the trees is that they are affected with indigestion and have a depraved appetite due

to the digestive disturbance. This appears to be the case, more particularly as you ask for information dealing with scour in calves and its cure.

The main cause of scour in calves is indigestion due to some irregularity in the feeding of the young animals. Indigestion may be present in a sub-acute form, when scouring is not seen, but such animals frequently eat foreign matter, such as the bark of trees. Scouring is the outward manifestation of acute indigestion.

The indigestion may be caused by over-feeding, irregularity in feeding, sudden changes in feeding, or unclean feeding receptacles. It is advisable to underfeed rather than overfeed. All changes in the feeding of young animals must be brought about in a gradual manner, the calves being fed at exactly the same times each day. Clean feeding vessels are very important.

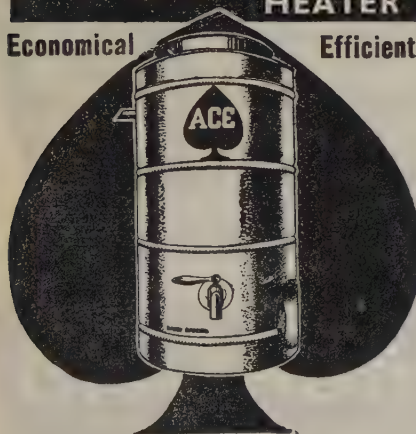
If scouring is seen the feed supply of the affected calf should be immediately reduced in quantity. A dose of castor oil, up to a quarter of a pint, depending upon the age of the calf, should be given to clean out the irritating matter from the bowels.

The calf should be given a few small feeds of whole milk for a day or two until scouring ceases. Dilute this milk with an equal quantity of warm water.

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and give a few doses of ordinary household baking soda. A tablespoonful of baking soda may be given two or three times daily in a little milk or water. Lime water will be found very useful in assisting the calf to overcome the indigestion.

The small lumps on the pigs' legs are probably caused by injuries in the sty or about the feeding troughs. The store pigs should be given as much good green feed as possible. A run on short clover pasture daily would materially assist in providing vitamins and mineral matter, and thus eliminate the possibility of lumps due to the onset of rickets in the pigs. If the pigs are liable to injury in the sty or feeding troughs the cause of the injury should be attended to and removed.

Lameness in Dairy Cow

C.P. (ASHHURST):—

I have a cow which has become very lame in the last twelve months. She is about a sixth-calver, and I have had her from a heifer. Some time ago she used to get lame for some months before calving in a front leg in the joint

above the hoof, but in the last twelve months the lameness has gone to a back leg in the knee joint. There is a very large swelling on the inside of the joint, and, of course, the cow

Advisory Service on Veterinary Matters.

Farmers are invited to submit inquiries connected with the health of their stock, and the replies will be published under this heading.

is distressingly lame and finds it very difficult to get far.

I might add I have only a small piece of land, all flat. The cows have bone-flour and salt lick. If you can suggest any treatment, I shall be most grateful.

LIVESTOCK DIVISION:—

Without an examination of the animal it is rather difficult to know the exact nature of the lameness and the underlying cause. As the cow has been lame for such a long time, and as the lameness has moved from the

fore limb to a hind limb, one must suspect a deficiency of a nature interfering with the proper function and repair of the bony skeleton. This tentative diagnosis is more likely to be true if the animal has been a high producer during her several lactation periods, and because of the cows being confined to a small area of grazing.

Taking this view, the remedial measures would consist of feeding the cow with a daily ration of good-quality clover or lucerne hay. A ration night and morning of a few pounds of bran to which is added two tablespoonfuls of bone flour should also be provided.

As a preventive measure for future seasons one would suggest top-dressing the paddock, and, the land being flat, lime may prove very beneficial in addition to any other manure used.

On the other hand, the cow may be affected with trouble of a rheumatic nature, but this complaint is very rarely seen in the domestic animals, even in comparatively old animals. It is suggested that the feeding programme be adopted and the progress of the case be watched.

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Farm Practice and Management

Contributed by Officers of the Fields Division

Draining Spade Makes Efficient Tool For Dealing With Gorse Bushes

THE usual tool used to eradicate clumps of gorse is the mattock, or hand grubber. This tool is quite handy and easy to manipulate when dealing with small gorse plants, but it is more difficult to use when fairly large bushes have to be dealt with.

A method of dealing with large bushes by digging them out with an 18-inch draining spade has been seen by the writer, and is considered worthy of mention as being a considerable improvement on the mattock. Those using a draining spade for this work assert that big clumps which would take from 15 to 20 minutes or longer to remove with a mattock can be dug out with the draining spade in from three to five minutes.

In the case of a large bush the spade is first of all used to clear round the

base by cutting off the low branches. Then, by sharp downward blows around the base of the plant about nine inches from the trunk, the surface roots are cut. The spade is then driven down under the crown to cut the tap root well below the earth surface. The plant is then levered out and the earth heeled in and firmly tramped to prevent any light or air reaching the cut roots. A gorse plant treated in this manner will not grow again.

The draining spade is considered the quickest and most efficient hand implement for this purpose provided it is kept sharp and clean.

—E. B. GLANVILLE, *Instructor in Agriculture, Whangarei.*



Fig. 2.—Gorse bushes such as this are difficult to grub out with a mattock. Bottom branches have been cut to allow the spade to be worked near the trunk of the plant.



Fig. 1.—An ordinary 18-inch draining spade makes an efficient tool for dealing with large gorse bushes. The draining spade is quick, and makes a good job.

Supplies of Rape Seed

WITH the time fast approaching for the sowing of rape crops, many farmers will no doubt be concerned in regard to the availability of sufficient supplies of seed. From information at present available to the Department, it would appear that if farmers exercise reasonable care, there is sufficient rape seed in the country for 1940 sowings.

The position will be adequately safeguarded if every farmer will reduce his rate of sowing by four to eight ounces per acre and make any surplus of seed he has in hand available to some other farmer who is not able to obtain sufficient seed. This small precaution will in no wise affect the stand of rape obtained, particularly as much of the rape seed to be sown this spring is locally grown certified seed from last season's harvest, and as such is of the highest germination and vigour.

At the same time, it may mean the provision to some other farmer of his full requirements in regard to a rape crop, thus assisting materially to maintain the production of the country.

There need be no fear that seed should be conserved against a fear of shortage for sowing in 1941. There are more than 1,000 acres of rape, sown specifically for seed production, at present under the supervision of the Department. Basing yields on the very conservative figure of 6 cwt. per acre (last year's average was 9 cwt.) this area will produce ample seed for one year's requirements plus a considerable carry-over into the subsequent season. The possibility of a shortage of rape seed exists only for the coming spring, therefore, and farmers can offset even this possibility by adopting the suggestion made above.

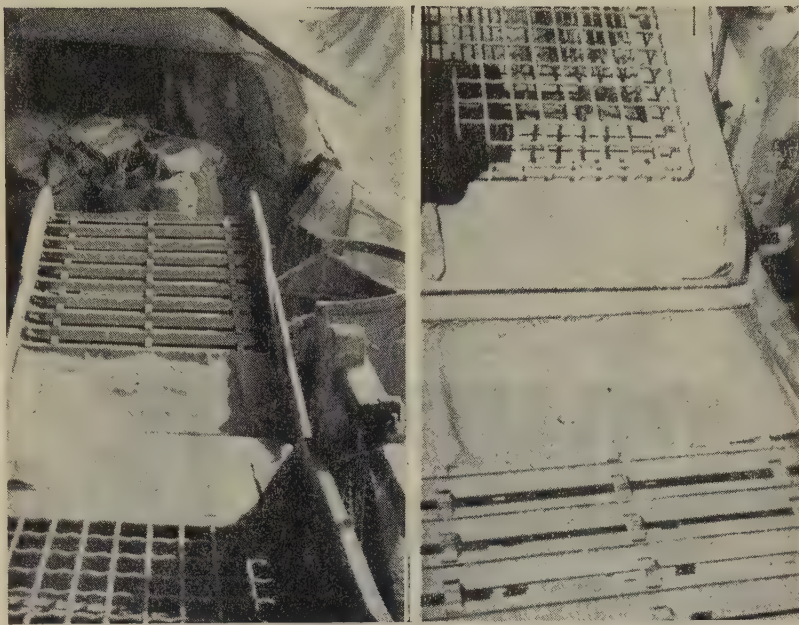
—J. H. CLARIDGE, *Seed Certification Officer, Wellington.*

Improved Potato Sorter

AN interesting improvement on the standard pattern of mechanical potato grader has been introduced on the farm of Mr. G. H. King, West Belt, Rangiora.

By means of this improvement, exceedingly simple as it is, it is possible to obtain a much more accurate control over the undesirable type of potato which might otherwise escape the notice of the sorter. It is more easy to observe blemishes, knocks, etc., with a much greater accuracy than is possible with the standard type of machine. What really happens is that every potato is rotated as it passes up the elevator, and thus has the whole of its surface exposed to the critical eye of the sorter.

This is how it is done. Merely tack or otherwise attach a piece of strong yet fairly thin cloth (a discarded window blind is excellent as a source of material) to the bottom of the elevating platform so that it covers about two-thirds of the length of the elevator.



Two close-up views of the attachment to the potato sorter.

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The attachment is carried out at the bottom just where the potatoes fall from the riddles. But in this case, instead of falling directly on to the elevator, the potatoes fall on to the cloth. The fluted surface of the platform "teases" the tubers from below the fabric and carries them upward, at the same time revolving them.

To achieve the best results it has been found necessary to tilt the grader so that the elevator loses some of its pitch; otherwise, the potatoes will keep rolling to the bottom and will not "creep" over the cloth. This tilting, of course, increases the pitch of the riddles. It also makes it impossible to fill the bags completely, as the bag hole has been lowered relative to the floor. However, both these difficulties may easily be overcome.

The important fact is that the machine really works.

—J. A. S. MILLER, Instructor
in Agriculture, Rangiora.

Harrowing of Pastures

H.J.F. (HAWERA):—

In your September issue on page 219 there is an article by C. R. Taylor on the subject of harrowing.

I agree with that article in full, and I follow the practice or, rather, I have since last May, when the roughage was cleaned up by the cows. I am of the definite opinion that my pastures are better for it. The tendency for clumps of grass has gone entirely, and my pastures are grazed clean.

With the paddocks I wintered on I harrowed weekly—the others I harrowed when the milkers had been on

them—and my problem is: When the cows finish grazing a paddock the droppings are too wet and sloppy to spread, and, if allowed to dry, the grass is too long and the harrows ride over.

My harrows are old and well worn, but if I had new harrows I feel that the damage to young pasture would make harrowing a loss. What is Mr. Taylor's opinion?

I may add that I wintered 43 cows, 20 in-calf heifers, 12 yearlings, two bulls, one horse, and 100 sheep on 97 acres.

FIELDS DIVISION:—

The harrowing of pastures is a phase of pasture improvement work which I have often discussed with you during my visits and instructional talks, and it is most gratifying to learn of the success you achieved by harrowing methods. When allowed to accumulate, animal droppings do, apart from the loss of fertiliser value, destroy good pasture and allow the establishment of inferior grasses and weeds.

Undistributed droppings will soon convert a good pasture into a patchy green sward, uneven in growth and difficult to graze—a common fault found in many dairying pastures throughout Taranaki. Pasture harrowing for the specific purpose of distributing animal droppings so as to utilise efficiently its fertiliser value and prevent sward damage does, as you mention, present practical difficulties. Fresh droppings, particularly in the spring months, are wet and sloppy; on the other hand, there are periods in the year when they dry up quickly and become dry and hard. Both these extremes make distribution difficult.

The success of harrowing depends on the work being done when the bulk of the droppings are at the best breaking-up stage, and experience here is the guiding factor. When cows have finished grazing a paddock it may, under certain conditions, be necessary to delay the harrowing for a few days because of sloppy droppings. Any postponement, however, must be carefully guarded to see that grass growth is not such that the harrowing causes pollution and mutilation.

Harrowing, therefore, should be done before any appreciable growth occurs, and although conditions may not always prove ideal, the best opportunity according to the condition of the droppings and grass growth should be decided on. Endeavour to get as near to the ideal as possible. Any imperfections after one grazing may be made up on the next.

Your reference to penetrating types of harrows is of particular interest. On good pastures the harrow directed at distributing animal droppings efficiently is what is required. Penetrating harrows pierce and open up the sward, causing some plant damage and allowing a medium for weed invasion. Further, consolidation is an all-important factor in maintaining good pastures on the porous volcanic soils of South Taranaki.

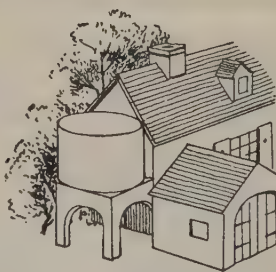
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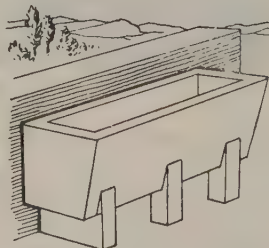
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Labour-Saving Device for Stacking Baled Hay

CONSIDERABLE work is entailed removing and stacking hay bales as they come off the baler, particularly when the baling takes place in the same paddock as the Dutch barn or shed is situated.

This difficulty has been overcome in a cheap and effective manner by Mr. M. J. Connor, Omapere Station, Crownthorpe. He has constructed a shute, the exact width of a bale. This is simply clamped on to the hay baler, and extends sufficiently far to reach up to a height of eight bales when stacked.

As the baler operates and each bale is pushed from the machine it is automatically pushed on up the shute until it reaches the top, where it is taken by the man stacking. The shute could, no doubt, be extended to stack higher, but anything higher than this would not allow the bales to be loaded under the eaves of the Dutch barn.

This invention means that only one man is required to stack the bales in the barn, which holds 1,500 bales. Formerly, it was a two-man job. Mr. Connor states that no more petrol is used per day with that extra load

than was used previously. Incidentally, the engine is an old 4-cylinder motor-car engine, and the shute was made on the farm with station timber. The timber is worn smooth, and apparently there is very little friction. Should the load be too great for a smaller engine, rollers could be fitted.

Mr. Connor has a Dutch barn in each of the lucerne and red clover paddocks in which he regularly saves hay.

—R. P. HILL, *Fields Instructor, Hastings.*

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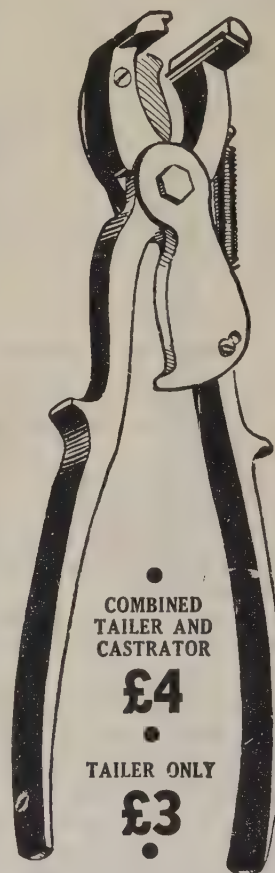
"1500 LAMBS TAILED SUCCESSFULLY WITH A MOWAT," . . . Says Mr. W. W. Redcliffe, Hororata: "I found the 'Mowat' all you claimed it to be. It stops fully 90 per cent. of bleeding."

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The Orchard and Vineyard

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Orchard Notes

Spraying and Grafting Operations

DO you know that there are two sets of factors which chiefly control or determine the outlook of the fruitgrower—(a) the ability of the grower, and (b) the prospective condition of the market.

Very few persons appreciate how personal a thing success is, yet everyone knows that any two persons placed in similar environmental conditions and given an equal chance will arrive at very different results. It must be admitted that the real directive forces are matters of character and personality, the most important of which seems to be the love of occupation and energy and ability to handle it in a proper manner. Everyone looks for success, but some, alas, have been disappointed.

Don'ts in Spraying.

Don't use iron or tin vessels for Bordeaux mixture, as it will destroy them and possibly be detrimental to the spray.

Don't spray the trees when they are wet, either after heavy dew or rain.

Don't mix together copper sulphate and milk of lime for making Bordeaux mixture before either one or both are very much diluted.

Don't mix up more spraying material at a time than you can use in one day.

Don't guess either the weight or measurement of the spraying materials you are going to use. Damage can be caused by over-strong mixtures, or you may fail to control the disease if the spray is under strength. All certified spraying materials have been proved to be not only safe but also effectual so long as the directions are followed carefully.

Seasonable operations in the orchards are:—

- (1) Spraying for the control of disease.
- (2) Reworking or grafting.
- (3) Cultivation.

Successful spray control depends upon a number of essential factors:—

- (1) A knowledge of the disease it is intended to control.

(2) The use of the most efficient economic spray material.

(3) The correct mixing of the spraying materials.

(4) Application of the spray at the correct time.

(5) Application of the spray in adequate quantity, and an equipment which will give sufficient pressure and spray coverage.

The following spray schedule is recommended for apples and pears:—

APPLE SPRAY SCHEDULE.

1.	Dormant	Winter oil 5%	1-20	Scale insects, red mite.
2.	Green Tip	Bordeaux mixture 5-4-50 or Lime sulphur 0.5%	1-30	Black spot. Powdery mildew.
3.	Open Cluster and Pink	Lime sulphur 0.1%	1-150	Black spot.
4.	Petal Fall	Lime sulphur 0.1% plus A. Lead 1½ lb. to 100 gals. 3lb. hydrated lime to 100 gals. 2lb. colloidal sulphur 100 gals.	1-150	Black spot. Codling moth. For russet—susceptible varieties replace L/S with colloidal 3-100. With C.O.P. and Jonathan use only 2-100.
5.	Repeat No. 4 at intervals of 10 to 14 days and subsequently as required.			
January		Bordeaux mixture 1½-3-50, plus A. Lead 1½ lb. to 100 gals., plus spreader.		Glomerella and codling moth.

It may be necessary to repeat this and should red mite be present add 1½ 1-100 summer oil.

PEAR SPRAY SCHEDULE.

1.	Dormant	Winter oil 5%	1-20	Scale insects.
2.	Green Tip	Bordeaux 5-4-50 or 4-5-50		Mealy bug. Black spot.
3.	Pink	Bordeaux 3-4-50		Black spot.
4.	Calyx	Bordeaux 2-3-50 plus A. Lead 1½ to 100 gals. or (Lime sulphur 0.1% 1-150 plus A. Lead 1½ to 100 gals. plus hydrated lime 3lb. to 100 gals.)		Black spot. Codling moth. Substitute for the above for all tender varieties.
5.	14 to 17 days later ..	Bordeaux 1½-3-50 plus A. Lead 1½ to 100 gals.		Ditto Ditto

Subsequent sprays as required at intervals of 17 to 21 days up until the middle of February.

It may be necessary to modify or alter this schedule to meet varied conditions, such as varieties or susceptibility to the various diseases. Any further particulars can be obtained from officers of the Department of Agriculture.

Grafting

GRAFTING is an old art; the ancients knew that it was possible to transfer a branch of one variety to another of a related kind. To carry out this work successfully, it is desirable that one should have quick and true eyesight, supple and sure fingers, and a sharp knife with an over-thick blade. At grafting time the sap of the scions should be several weeks behind the stocks, and they should be selected from well-ripened, one-year-old wood while the trees are quite dormant. They should be kept in moist soil in a cool place until wanted.

Many different methods of reworking have been carried out, such as cutting the trees back to where the first branches were formed, and the porcupine method was introduced a few years ago, which entailed laborious ladder work. I would strongly recommend the intermediate system—that is, head the tree at about 6ft or 7ft from the ground and then follow the porcupine



A power sprayer drawn by a caterpillar tractor in operation. The capacity of the spray tank is 400 gallons, and the spray guns each have four delivery nozzles with a pressure of 400lb.

system. By doing this, all ladder work is eliminated and the trees can be brought back to full production in quite a reasonable time.

Grafting Pollinators On Limbs

Where trees consistently fail to set crops of fruit it is generally due to

lack of pollination. This can be overcome to a great extent by grafting one lateral on to each tree or two or three on to each second or third tree. Here are a few essentials for a good polleniser:—

- (1) The two varieties must bloom at the same time.
- (2) The varieties must have an affinity for one another.

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77/6

Ex Warehouse,
London.

(3) Both varieties must produce large quantities of pollen.

(4) Varieties should be good commercial ones.

As blossoming dates of the different fruit trees vary with the climates, growers are advised to obtain this information for their particular district from the officers of the Department of Agriculture.

Inarching or Bridge Grafting

Where trees have been seriously injured by hares or rabbits, or even by implements when cultivation takes place, the method of inarching or



A sketch showing bridge grafting and inarching for the rejuvenation of trees which have had the trunks injured.

bridge grafting can be used to reinvigorate the tree. The accompanying rough sketches give some indication of how this work is carried out, which presents very little difficulty to one who is used to grafting.

Points to remember when grafting are:—

(1) All tools should carry a keen edge; otherwise the work cannot be properly and expeditiously carried out.

(2) When inserted in the limb the scion should be held tightly in position by binding with some suitable material or tacking, according to the method of grafting.

(3) After the graft has been inserted all cut surfaces should be carefully painted with grafting wax. This is necessary for the exclusion of moisture and air.

(4) The grafts should be inspected frequently during the early growing period, and as soon as the ties show any sign of cutting into the stock they should be removed.

Recipe For Grafting Wax

Melt together 1lb tallow, 1lb beeswax, and $\frac{3}{4}$ lb of resin, use either warm or cold. If waxed calico is preferred, 6-inch strips can be dipped into the hot wax, and when thoroughly soaked remove the surplus wax, after which the calico can be torn into strips of the desired width.

Cultivation

IT is useless to attempt to describe a method of cultivation that could be adopted by all growers. So much depends upon the nature of the soil, rainfall, and position, etc., that one method suitable for a particular area may be entirely valueless for another. However, cultivation should receive attention when weather conditions are favourable for the following reasons:—

(1) It prevents evaporation by reducing the conductivity of heat and also by breaking up the capillary tubes in the soil through which the subsoil moisture escapes.

How to Make

Bordeaux Mixture.

How to prepare 100 gallons of 5:4:50 Bordeaux mixture.

Place 10lb. of copper sulphate in a piece of scrim or sacking and suspend it in at least 10 gallons of water (wooden or earthenware vessels). This will dissolve in quite a reasonable time, but if required at short notice it can be dissolved very quickly by using boiling water. Place 8lb. of hydrated lime in a 4-gallon bucket, mix it to a thin paste, and then make it up to 4 gallons.

The copper sulphate can then be put into the spray tank and made up to about 90 gallons, and, with the agitator running, pour in the four gallons of milk of lime and add water to make up to 100 gallons. The mixture is then ready for use.

Any quantities more or less can be made in the same way by reducing or increasing the weights of the copper sulphate and hydrated lime.

(2) By letting the air into the soil it enables the bacteria to breed quickly and extract the nitrogen from the air, which is so necessary to plant life.

(3) The broken surface enables the moisture in the air to circulate freely through the soil, and much of the moisture is absorbed and held by the ground when heavy dews take place.

(4) It kills the weeds, which use a large percentage of the useful food ingredients in the soil.

—L. PAYNTER, District
Supervisor, Auckland.

Citrus Notes

Spray Programme for the Coming Season

BY late September another growing season will have started in the citrus orchards. What quality and quantity of fruit are you going to harvest during the coming season? Your success as a citrus grower depends so largely upon these two factors that every citrus grower must seriously consider them, and this is the season of the year when the crop prospects for the coming year are most readily influenced.

For quality and quantity remember: **CULTIVATE, MANURE, SPRAY.**

Citrus trees should be cultivated lightly after they have reached maturity. During the earlier years hand-digging and ploughing are satisfactory, but once trees have begun to crop it is unsound to dig too deeply near the trees or to plough close up to them. After all, at this time of year trees are beginning to grow new foliage and fruit, and how can this growth

be maintained if all the fine root hairs of the roots are broken by deep cultivation?

Of what use is the application of manures just now if by cultivation the tree is repressed in such a manner that it cannot absorb the manures available, and if by the time new roots are formed the soluble nitrogen in the form of nitrates has been leached from the soil where the feeding roots penetrate. Therefore, remember this spring to

dig or hoe lightly around your citrus trees and to disc or plough with discretion.

The soil should be aerated by tine cultivators or disc harrows, but not overworked during the coming months, as by over-cultivation humus tends to be burnt out of the soil instead of being built up, and humus is an essential constituent of a citrus orchard soil.

Reference was made in last month's citrus notes in the "Journal" to manurial practices. If in doubt, concentrate upon organic manures, blood and bone, fish manure, fowl or sheep manure.

To obtain good quality fruit, and also to retain the vitality of bearing trees, it is essential that citrus crops be kept free of disease. Of what use is it to grow a good quantity of fruit if it is unmarketable through citrus verrucosis or red scale? Prevention is therefore essential, and here is a spray programme for the coming season. For the small grower, the standard spray mixtures are also set out in terms of 4 gallons or a kerosene tin.

Lemons

(1) **Pre-blossom of Main Crop.**—Bordeaux 3:4:50, or 4 oz. bluestone

and 5½ oz. hydrated lime to 4 gallons water to prevent verrucosis, melanose, grey-scab, and wither tip.

(2) **Petal Fall of Main Crop.**—Bordeaux 3:4:50 plus acid lead arsenate 1½ lbs./100 gallons, or 4 oz. bluestone, 5½ oz. hydrated lime, and 1½ oz. acid lead arsenate to 4 gallons of water to prevent or control verrucosis, melanose, grey-scab, wither tip, and leaf-roller caterpillar.

(3) **Late December.**—Bordeaux 3:4:50.

(4) **Mid-February.**—Summer oil 3 per cent. and nicotine sulphate 1-800, or 1 l-5 pints of summer oil and 6 teaspoons of nicotine sulphate to 4 gallons water for the control of red scale and other scales, thrips, black-aphis, red-mite, mealy-bug.

(5) **Three to four week later.**—Summer oil 3 per cent. for the control of red-scale and other scales.

(6) **Petal Fall of Autumn Crop.**—Bordeaux 3:4:50 for the control of verrucosis, melanose, grey-scab, wither tip, brown rot, and citrus blast.

Oranges

(1) **Petal Fall.**—Bordeaux 3:4:50 plus 1½ lb. acid lead arsenate—100 gallons

for melanose, grey-scab, wither tip, and leaf-roller.

(2) **Early January.**—Acid lead arsenate 1½ lbs.—100 gallons for leaf-roller.

(3) **Mid-February.**—Summer oil 3 per cent. plus nicotine sulphate 1-800 for control of red-scale and other scales, thrips, red-mite, black-aphis, mealy-bug.

(4) **Three to Four Weeks Later.**—Summer oil 3 per cent. for control of red-scale and other scales.

(5) **Early May.**—Bordeaux 3:4:50 for control of brown rot, wither tip, and citrus blast. Reference to the correct manner of preparation of these sprays will be made in future citrus notes in the "Journal."

In conclusion, if a good setting of fruit is desired this season, keep your monthly pickings of lemons up to date and harvest oranges as they reach maturity.

—A. M. W. GREIG, *Citriculturist*,
Auckland.

Viticulture

Downy-mildew of the Vine

(Continued from the August issue.)

Simple Test

If there is any doubt as to the nature of oil-spots which do not show down on their under-surface a simple test may be applied. A few suspected leaves folded in a damp cloth or blotting paper and placed in a warm atmosphere will, if affected, develop down in about 24 hours.

Towards the end of the growing season the usual spots do not appear after infection, but in their place a mosaic of different-coloured spots resembling a tapestry pattern is seen on the surface of the leaf. In the place of fruiting organs growing out of the stomata, winter spores or oospores are formed by fusion of the male and female organs in the interior of the leaves. These oospores are protected by a resistant covering which carries them safely through the winter.

Germination of oospores from rotting leaves in the spring depends on their immersion in water at a temperature of at least 50 deg. F. for a period of not less than 24 hours. On this account it is advisable to look for the first outbreak of the disease in the lower parts of the vineyards near

creeks, pools, or other spots where water remains for some time after rain. Gathering leaves and burning them at the end of the season suggests itself as a method of prevention, but this has not proved effective.

From the germinating winter spore a filament of mycelium or conidiophore grows, terminating in a single conidium resembling the summer conidium, but seven or eight times larger. Inside this conidium are formed a number of small zoospores furnished with cilia, and it is these small spores that cause the fruit infection.

The area of this first infection is generally so small that it frequently passes unnoticed. The actual damage done is insignificant, but very shortly summer spores are formed and scattered in countless numbers through the foliage of the vines.

Treatment

It is evident from a study of its life history that downy mildew can be combated only during its growing period. Winter treatment has proved of no use whatever. As no over-wintering form of the fungus occurs on the vine, it is obviously useless to apply

fungicides in the dormant season. The over-wintering form of the disease is in the leaves of the previous season either in or on the soil of the vineyard, where it is beyond the reach of sprays. Control must be preventive; a cure is impossible.

The whole plan of downy mildew control is, in brief, as follows:—

Once the fungus has entered the tissues of the vine it is beyond reach, and it is not possible for a spray applied at that time to check the infection, which must run its course. The only possibility is to prevent infection, that is, to prevent the entry of the mycelium into the vine tissues. Fortunately, the susceptibility of the zoospore allows for effectual control, which is not as difficult as is generally thought.

A very small portion of fungicide is sufficient to prevent infection. Millardet and Gayon in 1885 showed that 1 in 10,000 of lime, 1 in 100,000 of iron sulphate, or 3 in 10,000,000 of copper sulphate was sufficient to destroy the spores before infection occurred.

As spraying is preventive, it must naturally precede infection. Bordeaux mixture is the most effective control

What To Do In The Garden Next Month.

Summary of Operations During October

VEGETABLE SECTION.

SUCCESSIONAL SOWINGS.

French beans, sweet corn (where frosts are over); lettuce, peas (a main-crop variety such as Greenfeast or Onward), radish, spinach (round-seeded), spring onion, turnip.

OTHER SOWINGS.

Lima beans, marrows and pumpkins (where frosts are over); beetroot (main-crop long varieties), borecole, broccoli, cabbage (savoy, red and winter varieties), carrots (main-crop, intermediate and long varieties), leeks, parsnip (if not sown last month), salsify, New Zealand spinach, tomato (for a late crop).

SEEDLINGS TO TRANSPLANT AND PLANTS TO SET.

Early celery (sown July), marrows and tomato (if frosts are over), lettuce, main-crop potato (unsprouted), kumara (in very warm districts the shoots, if ready, may be planted out, otherwise set them in nursery beds where they can be protected).

PERENNIAL CROPS.

Asparagus.—Remove shoots from two-year-old plantations for two weeks and from three-year-old plantations for four weeks, after which apply complete manure. Apply nitrogenous dressing to newly-planted areas ($\frac{3}{4}$ oz. to 9 ft. of row).

Rhubarb.—Cease pulling from winter beds and clean up and manure heavily with complete fertiliser and farm manure. Begin pulling from other beds.

CROPS IN SEASON.

(The month in brackets represents the month of sowing the seed.)

Salads.—Lettuce (July), radish (Sept.), spring onion (March).

Greens.—Asparagus, broccoli (October), broad beans (May), cauliflower (March-April), peas (May and early August), silver beet (October), spinach (August).

Roots in the Ground.—Carrot (Shorthorns, August), potatoes (May in warm districts), turnip (August).

CROPS IN STORE.

Beetroot, carrots and parsnips, kumaras, onions (if long-keeping varieties), potatoes, pumpkins and shallots.

GENERAL WORK.

Keep the ground cultivated and destroy weeds. Earth up early potatoes. Give transplanted and thinned onions a dressing of nitrate of soda or sulphate of ammonia at $\frac{3}{4}$ oz. to 9 ft. of row. Thin seedling crops (see "Seasonal Don'ts").

SMALL FRUITS SECTION.

Cape Gooseberries.—Transplant seedlings in frost-free districts.

Strawberries.—About the end of the month mulch the beds with straw. Before this the crop should receive a dressing of Peruvian guano ($1\frac{1}{2}$ oz. to the square yard or 3 to 4 cwt. per acre), or sulphate of ammonia (1 oz. to the square yard or $2\frac{1}{2}$ cwt. per acre).

Raspberries, Loganberries, etc.—Apply the third and final Bordeaux spray (3-4-50), combined with arsenate of lead (2 lb./100 gals. water), two months after bud movement in control of cane wilt, leaf spot and bud moth.

FLOWER SECTION.

Trim hedges; use secateurs on broad-leaf hedges and clippers on others.

Plant gladioli in succession.

Attend to seedlings. Prick into boxes when large enough to handle, and plant out as spring annuals are cleared away from the beds.

Plant out dahlias and chrysanthemums.

Lift, divide and replant gerberas. Small pieces each with one bud and roots are the best to plant. They should be planted firm with the bud level with the ground.

Take cuttings of violets and set them in fertile soil that does not dry out during the summer.

GLASSHOUSE SECTION.

In the heated tomato house and in forward cool houses a liquid dressing of artificial fertiliser should be applied when the fruit is swelling. A mixture of $\frac{3}{4}$ oz. each of nitrate of soda and sulphate of potash and 1 oz. of superphosphate in 1 gal. of water is sufficient for four plants, and should be applied several days after watering.

At this stage of development in dry localities a large amount of water will be required by the forward plants. If all the ground between the rows is flooded there should be no need for additional water for possibly a fortnight.

Remove the lower leaves to expose the first bunch of fruit, and so facilitate the movement of air about the plants.

acre just before transplanting. Following this, and when the seedlings have become established, a side-dressing of sulphate of ammonia or nitrate of soda at the rate of 1 to 2 cwt. to the acre is an advantage, as also is a second side-dressing a month later.

Note: $2\frac{1}{2}$ cwt. per acre is approximately equivalent to 1 oz. to the sq. yd

Raising Plants

Great care should be taken to raise vigorous and disease-free plants. This

may be accomplished by sowing healthy seed in a soil mixture which is free of celery diseases and which favours the development of the plants. The following points should receive careful consideration:—

(a) **The Seed-bed Mixture.**—A suitable seed-bed mixture consists of soil, sand and leaf-mould, which is fertile and which permits free drainage. Superphosphate at the rate of 8 oz. to the cub. yd. should be added and the mixture passed through a $\frac{1}{2}$ in. mesh sieve. It should be sterilised to de-

stroy celery disease and damping-off organisms. Such sterilising may be done efficiently by steam, or the soil in the boxes or beds may be watered with a 1.25 per cent. solution of formalin in water. Where the formalin method is employed the solution is prepared by adding 1 pint of formalin (38-40 per cent. formaldehyde content) to 10 gallons of water. Apply this solution to the surface of the soil in the seed-boxes or in heaps at the rate of $\frac{1}{2}$ to 1 gall. to 4 sq. ft. of surface area.

Sacks moistened with the solution should be placed over the soil and left there for 48 hours. Thereafter, with the sacks removed and the soil stirred with sterilised implements, the formalin will gradually evaporate. The soil is generally in a suitable condition for sowing about a fortnight after the formalin solution is applied. Used seed-boxes should be sprayed with this formalin solution.

(b) **The Seed and Seeding.**—The seed used should not be more than four years old. A method of treating it to destroy the celery leaf-spot fungus on the seed is given in the section on diseases. The seed should be sown thinly, $\frac{1}{4}$ oz. to the sq. yd., which can best be done when it is mixed with sand and covered lightly with soil. The surface of the ground should be kept moist. Protection from the drying influence of the sun and wind may be afforded by a covering of glass or sacking supported several inches above the soil. Ventilation and light are essential when the seedlings appear above ground. When necessary, water should be applied lightly and as a fine spray.

(c) **Time of Sowing.**—For early crops maturing from February onwards the seed should be sown in July under glass or in frames on a hot-bed of fermenting manure. Three to five weeks later the seedlings should be pricked into sterilised soil in clean boxes, from which they are ready for planting into the field in October eight to ten weeks after sowing the seed. For main crops a sowing in September will provide celery from April to the following September. Such seedlings are ready to transplant in November and December.

(d) **Transplanting.**—When the plants in the seed-bed are large enough to handle and conditions are not suitable for planting them into their permanent positions, they should be transplanted into clean ground $1\frac{1}{2}$ to 2 in. apart each way, and there grown until they are 4 to 6 in. high and ready to plant in the field. There is no need to plant them in the temporary beds if the small plants can be handled in the field. This is not always possible, but it is sound practice where the ground is free of weeds and can be cultivated without damaging the small seedlings. Whatever method of planting is followed, the seedlings must be transplanted when they are large enough to handle. In so doing the tap root is broken and, as the plant develops, it is replaced by a bunch of fibrous roots. One great advantage of planting direct into the field is the reduction of disease which, if not carefully controlled, spreads rapidly in the crowded nursery bed.

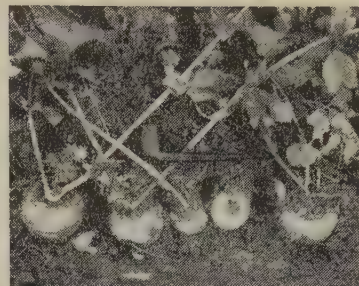
Seasonal Don'ts

Don't

sow seeds of half-hardy plants outside until all likelihood of frosts is past and the ground has warmed sufficiently to ensure good growth. Most frost-tender crops are tropical or sub-tropical, and, given favourable condition of soil fertility and warmth, they make very rapid growth. If sown or planted too early there is a possibility of their being destroyed by low temperatures or of making very slow growth. Later plantings which develop without any setback often mature quicker. The planting should not be delayed unduly, as maturity must be obtained before autumn frosts occur.

Don't

thin root crops unnecessarily. As a rule, when thinning most crops, thin to a distance apart so that the roots as they mature may touch one another. Large roots often lose in quality as they increase in size. Carrots are not required to be 6 in. in diameter. An inch to $1\frac{1}{2}$ inches is a sufficient size for



quick-maturing carrots, and $2\frac{1}{2}$ in. is adequate for the main crop. They should therefore be thinned to these distances. Globe beetroots of 2 in. diameter are quite large enough, but for the main crop 3 to $3\frac{1}{2}$ in. is a better size. Similarly, parsnips should not be over-thinned. The accompanying illustration shows the exposed tops of parsnips which have been sufficiently thinned. The pipe is 6 in. long and the five parsnips, which are of excellent size, occupy 15 in. of row.

Planting in The Field

The self-blanching varieties may be planted in blocks of up to six rows each 12 in. apart with the plants 9 in. apart in the rows. A space of 3 ft. between the blocks allows sufficient space for handling the crop. Celery grown by this method is planted in shallow drills.

Other varieties should be planted 6 to 8 in. apart in rows 4 ft. 6 in. apart when earthing up is to be done. Where blanching is done by placing boards along the rows less space is required between the rows. When planted in trenches 6 to 8 in. deep, which is a good practice on over-drained land, the distance between the rows may be reduced to 3 ft. to 3 ft. 6 in. Two rows 6 in. apart with the plants 9 in. apart in the rows may be planted in the same trench.

After the seedlings have established any failures should be replaced promptly by further seedlings held over for the purpose.

Attention After Planting

Apply the nitrogenous side-dressings referred to previously, the first after establishment and the second about a month later.

Cultivate the soil between the rows and about the plants to keep the weeds in check and to conserve moisture.

Attend to the spraying with Bordeaux 3-4-50 (see section on disease).

Apply water, when necessary, in generous amounts, and loosen the surface of the ground as soon as it can be handled.

Blanching

All that is required in blanching the self-blanching varieties when grown in blocks or in single or double rows is to place boards 12 in. wide along the outside rows. This should be done two to three weeks before this type of celery is required for use. Boards, or some such non-conducting material, are preferable to sheets of metal. Lift the crop as soon as it is sufficiently blanched; otherwise deterioration is likely to set in. The non-self-blanching varieties require five to seven weeks of blanching with soil or boards.

Before blanching all old leaves and suckers should be removed and the ground moistened if it is dry. Where soil is used and the plants are 12 to 15 in. high the leaves should be loosely tied together and a small amount of friable soil placed against the stems, followed by more at frequent intervals. Care should be taken that no soil penetrates into the heart of the plant. The stems and not the leaves should be covered with soil. As an alternative, boards held close to the plants by means of stakes so as to exclude the light may be used. In small areas the use of earthenware tiles or heavy paper is quite satisfactory.

(To be continued.)

—F. SYDENHAM, Assistant Horticulturist, Wellington.

APIARY NOTES



*Contributed by Officers
of the
Horticulture Division*

Operations in Queen-rearing

THE beginner should take warning of the danger of leaving any hive open too long in the early spring and autumn, for when there is not much honey being gathered the bees are constantly on the lookout to rob any unprotected hive. If the hives are left open too long and frames of honey are exposed at this time of the year, bees from other hives are greatly tempted to seize the opportunity of gaining stores by robbing.

Should there appear any sign of bees flying around and alighting on exposed frames, the hives should be closed up at once and the entrances further contracted.

Stores

Many bee-keepers fail to realise the enormous amount of honey which is consumed by the bees at this time of the year when brood-rearing is in full swing. Great care should be taken to see that every hive has sufficient stores to carry on brood-rearing without interruption until the main honey flow begins. So long as there is a little capped honey in the combs the bees are safe from starvation, but the amount may not be sufficient to last for all purposes until the main honey flow begins.

Queen-rearing

The business of honey production almost entirely depends on the bee-keeper's ability to produce good young queens and place them safely in the hives at the right time. A start may be made in most localities during spells of good weather conditions from September onwards.

Laying Capacity Of Queens

It was Swammerdam who, by his researches in the latter half of the seventeenth century, settled once and for all the sex of the queen bee and her proper function. Since that day

many investigators have checked the egg-laying capacity of a good queen. This can be accomplished by confining a laying queen in a given space of cells for 24 hours and then counting the number of eggs laid during that time. It is now clear that although a queen may lay up to 3,000 eggs in 24 hours, the daily average of a good queen over a period of one month is approximately 1,500 eggs.

It is something like this performance, combined with qualities mentioned in last month's apiary notes, at which bee-keepers should aim when stocking the hives with queens. To have a few such queens in every apiary is not good enough if bee-keepers are to get the maximum returns from their labours.

Final Selection

Having noted a number of queens which fairly measure up to the points already described, the final consideration should be purity of strain. The more fixed the strain the more likely the characteristics are to be transmitted. Evenness of colour and markings in the progeny of queens, both drones and workers, is the guide to final selection.

Others engaged in the livestock industry have benefited more through the application of principles of scientific breeding than have bee-keepers, simply because controlled mating can be practised, while the average bee-keeper has no control over individual males or females at mating time. The average bee-keeper can, however, assemble bees of good type, and to a large extent assist Nature to perpetrate desirable strains.

Although queens may be raised at any time during the season when there are flying drones in the apiary, the ideal time for cell building is during a light honey flow in the spring months. The hives to be manipulated for cell building should be strong and have an abundance of nurse bees. It is desirable, also, to feed the bees lib-

erally every night with sugar syrup (equal parts sugar and water) for at least three days before starting operations, even when there is a light honey flow, and to continue feeding lightly until the queen cells are capped. If there is a good honey flow no feeding will be required. The bees should also have a liberal supply of fresh pollen in the hives.

Failing Queens

Lack of a solid mass of brood, or insufficient quantity of developing brood, where there is plenty of room for the queen to lay when conditions are right, are indications of a poor or failing queen. Such queens should be replaced at the earliest opportunity.

Raising Queens

Queen-cells taken from swarming colonies may be used to advantage, but this practice is not recommended, because the tendency to swarm may be carried on to the next generation. If swarming cells are used a piece of comb should be cut out around the cell, care being taken not to injure the cell in any way. A hole of corresponding size should be cut in the comb of the colony to be re-queened, and the piece containing the cell fitted into it.

If there is only one cell on a comb the entire comb may be placed in the centre of the colony to be re-queened after removal of the old queen. Never shake this comb free of adhering bees, as this may injure the undeveloped queen in the cell, but carefully brush off all or most of the bees.

Emergency Method

Another simple method of re-queening is to remove the queen from a colony, after which the bees will build a number of queen-cells. Many inferior cells are raised, however, by this emergency method; consequently only the largest and best of the cells raised this way should be used.

(Continued on page 228.)

Notes for the Poultry Farmer

Contributed by Officers
of the
Livestock Division

Brooder Management and Prevention Of Chicken Mortality

EVERYONE engaged in poultry-keeping, either as a side-line or as the means of making a livelihood, is faced during the spring months each year with the question of replacement of the flock with sufficient young pullets, and this is essential where a profitable winter egg production is desired. It is, however, a problem which has in many cases proved to be the deciding point in making a success or failure of the undertaking.

Experience Necessary

The brooding and rearing of chickens presents no great difficulties to the experienced person who has acquired the practical knowledge of how to carry out this work successfully. Generally, these poultry-keepers have cultivated those keen senses of observation, hearing and smell, to such an extent that they quickly detect any possible trouble and remove the cause before it is too late.

Some people are most successful with one particular method of brooding, yet others, even in the same locality and working under almost identical conditions, appear doomed to failure through lack of experience. There are no hard and fast rules as a guide in the art of artificial brooding of chickens, nor even a correct table for the heat under the hover, but it has usually been found that the application of common-sense methods and close attention to little details are most likely to achieve the best results in brooder management.

Causes of Brooder Troubles

Experience has proved that many brooder troubles are caused by chilling the chickens in the early stages,

lack of attention to cleanliness, overcrowding of the brooding capacity, dampness of the bedding material, and insufficient ventilation under the hover. These are the main dangers to be guarded against, for they bring about more losses in young chickens than any other known cause, and these conditions even apply to good, healthy chickens which have been hatched from eggs produced by well-developed and carefully-selected breeding stock possessing the desired constitutional vigour.

Preventing Spread Of Diseases

Chickens may be affected with infectious diseases, such as pullorum (bacillary white diarrhoea) spread from carriers in the parent stock, or they may contract coccidiosis by coming into contact with germs on infected egg shells, eating small particles of these shells, or the excrement of other infected chickens. However, while these diseases may exist and are well known to cause very serious mortality among chickens at times, the conditions to which the young chicks have often been subjected are responsible for accentuating these diseases to a marked degree.

Investigations in the past have generally proved that brooder management has, in many cases, been the cause of increasing mortality due to these two particular diseases, and changes made in the methods of brooding have shown a decided improvement in results.

Brooder Trouble

Chilling is brought on both by under- or over-heating, giving the chicks too much liberty in the first few days, insufficient bedding materials, and allowing chickens to huddle in patches of sunshine on the floors of the houses.

A little time spent in educating the chickens to obtain their warmth under the hover, by making them return to the brooder after feeding times in the first few days, will be well worth while, and goes a long way in assisting to prevent chills. Any neglect in this matter will cause chilling and serious losses through bowel troubles, and white scours will most likely follow.

Brooder Hygiene

The proper sanitation of the brooder by regular attention to the removal of droppings, renewing the bedding material, and keeping clean the feeding and drinking utensils by systematically cleaning and washing, plays a most important part. This will prevent the spread of any troubles which may be affecting one or two of the chickens, and, as mentioned before, a great deal of this infection can be contributed to coming into contact with the excrement of other infected chickens. Too much care cannot be given to this point in proper management. Investigations made in other countries have definitely proved this fact, and this opinion is emphasised in articles written by the world's best authorities on the subject.

Where chickens are given an outside run on clean grass pens, it is better to have fresh houses and pens for each hatch rather than to keep moving the older chickens on to further clean areas and making the second and third lots run over the same ground, which very often is contaminated to a certain extent with droppings.

It is remarkable how the ground on which one batch of chickens may be running, even if it does appear to be getting a little dirty, will not affect them to any great extent; but if other chickens are allowed to mix up with them, or a new lot compelled to run over the same place, even after reasonable measures of cleaning up have

been adopted, losses will soon make their appearance, and sometimes mortality becomes fairly heavy.

Shifting chickens to contaminated ground is responsible for early infestation of parasites, such as intestinal worms and coccidiosis, etc., which are becoming far too common in this country. For this reason, the colony system of giving clean ground to each hatch is most desirable, but if the plant is limited in area the intensive system of keeping the chickens inside the houses, the cleaning of which can be carried out efficiently is better than running the risk of losses by allowing chickens on more or less fouled ground.

Having sufficient houses to accommodate and rear each lot of chickens without moving to fresh pens will not only prove most economical in the long run by reducing the labour costs, but will also prevent cases of mortality in the rearing of stock.

Overcrowding Of Brooder

Overcrowding of the brooder is another method of increasing mortality, and it should be remembered that about every 20 chickens placed in a brooder will alter the temperature under the hover by one degree in heat. Overcrowding prevents the chickens spreading out comfortably at night and getting away from the warmth or moving up closer to it, as desired, with the result that they quickly get into a sweated condition by the amount of moisture given off in their breath, become weakened, and suffer from a lack of vitality and resistance to sickness and disease.

In general, it is always a wise precaution not to place more than about half the quantity of chickens under the brooder that it is usually supposed to accommodate; this has proved the best method of preventing losses by overcrowding. A careful watch should be kept on the chickens just as they are camping or settling down for the night to see that they do not crowd. The cockerels should be picked out as soon as they can be detected, as this allows extra room for the pullets.

It is also wise to encourage the chickens to perch as soon as they are fit to leave the brooder. If well brooded, Leghorn chickens should be ready for perching at between six and seven weeks old, but care should be taken to see that they are gradually hardened off.

Avoid Dampness

The prevention of a moist atmosphere under the hover is essential for the welfare of the chickens, and attention to this important matter is most necessary after the chickens are three weeks old. Since the introduction of mass production methods of chicken-rearing and the use of large canopy

"Chicks like young CART-HORSES"

That's the way
YOURS will be
too, if reared
on the **Kars-**
wood Plan.



No doubt by this time poultrykeepers generally have made their initial contribution towards forming a huge additional army of heavy-laying pullets next year and have their new hatched stock already on their feet. The main problem now is to guard against future losses and develop the hatch safely, to lay in early autumn, 1941.

Year after year, without fail, leading poultrykeepers find that placing their growing stock on Karswood is the surest way to **MAKE THEM THRIVE**. Read the opinions of these chick-owners who have proved for themselves that Karswood Poultry Spice gives growing chicks a head start to profits . . . steps up their livability . . . is one of the grandest tonics for both young and matured stock in the world:—

Chicks Like Young Cart-horses.

"My first hatch of chickens turned out lovely; I set eleven eggs and had out nine chicks; the second hatch I had the same results; and the third hatch, 13 chicks out of 13 eggs. I have now about 160 chicks in all, and they are like young cart-horses, full of life and vigour and all receiving the daily dash of Karswood in their food. I have followed the Karswood plan for years and have found nothing better for making chicks thrive to an early maturity."—A.J.

Rarely Lose a Chick.

"I have used Karswood for six years. My chicks are so healthy and strong and do so well I would not like to be without Karswood. I rarely lose a chick through sickness, and find they usually lay at six months old. I have found your Karswood excellent also for keeping the adult birds in good health, as well as in full lay."—G.M.

Not One Chick Died.

"I was very successful last year in chick rearing, with the assistance of your Karswood. The last week in September I hatched 84 chicks and made up my mind to feed these the Karswood way. I never lost a chick and have never had chicks grow and feather so quickly before."—M.R.

(Original letters on file for inspection.)

Karswood is obtainable: $\frac{3}{4}$ lb. packet, 1/-; 1lb. packet, 2/-; 7lb. tin, 12/6.

KARSWOOD

POULTRY SPICE

brooders, where 400 or 500 chickens are reared in one lot, a number of poultry-keepers have had a trouble among their chickens known as "green-leg" or "green-wing."

The first symptoms of this trouble are generally a swelling of the head or back of the neck, and on examination it will be found that the neck joints are swollen and discoloured, while the joints of the wings also often are affected. When the neck and head are badly affected the chicken has difficulty in breathing, and death usually follows. The trouble is really caused by incorrect night conditions, dampness of the bedding material, overcrowding, and insufficient ventilation, which causes many chickens to rebreathe the same impure air.

Like many other chicken ailments, this trouble is much easier to prevent than to cure. The best means of preventing the trouble is not to overcrowd and to provide plenty of good, dry, bedding material; in fact, it is advisable to place some fresh, dry, bedding material under the hover each night after the chicks are 10 to 12 days old. At all times guard against the use of cured hay for bedding litter, as it becomes damp quickly in wet weather.

Ventilation

The want of fresh air under the brooder not only tends to cause dampness, but is responsible in most cases for heavy mortality among chickens with a trouble known as "brooder pneumonia." This malady usually affects the chickens after they are three or four weeks old, and is also brought about by breathing impure air at night, air which is sometimes saturated with moisture and kerosene lamp fumes. The only way of overcoming this difficulty is by supplying ample ventilation to the hover.

Successful brooding conditions can be obtained only when all requirements are attended to by providing the desired heat and a satisfactory system of ventilation. The latter, however, is not provided in most makes of brooders, and therefore a suitable method of working the brooder has to be adopted.

As a result of experiments conducted at the Wallaceville Poultry Station, where brooders of the canopy type are used, both green-leg and brooder pneumonia have been overcome by means of a simple arrangement of a framework base covered with wire netting. Illustrations of this frame will be seen on pages 80 and 81 of the Department's latest issue of Bulletin No. 66, "Utility Poultry Keeping."

However, while this frame is most useful in obtaining the desired conditions, it has been found rather heavy and cumbersome in actual practice, and

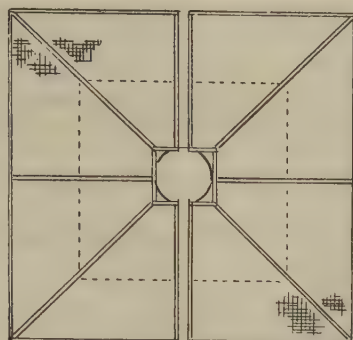


Fig. 1. Showing Frame in Two sections and opening for central ventilation.

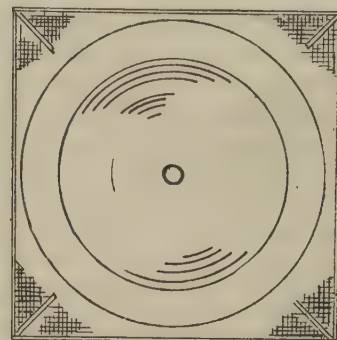


Fig. 2. Plan of assembled brooder with wire netting exposed in corners for entrance of air.



Fig. 3. Sectional elevation with electric radiator element.



Fig. 4. Sectional elevation with kerosene lamp.

Fig. 5 (Below) Frame for overhead heated brooder

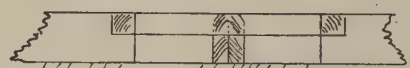
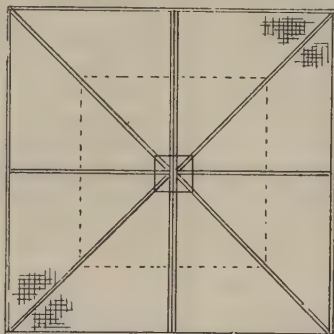


Fig. 6. Details of middle square where air enters centre of brooder

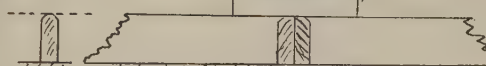


Fig. 7. Arrangement for use with frame shown in Fig. 5

particularly where the work of brooding is carried out by women.

Improved Frame

The accompanying drawings illustrate the construction of a modern frame and one made in two light sections which has been designed to provide and allow fresh air to enter the centre of the hover where most brooders are heated; Figs. 5 and 7 illustrate the construction of the same type of frame for use in overhead-heated brooders. In actual practice, this design of frame has given most successful results by allowing the fresh air to enter the brooder in the centre without causing draught, and has proved an exceptionally good method of overcoming many of the troubles described.

Fresh air contains the oxygen so necessary for the maintenance of good health and the steady body development of the chickens. It is obvious,

therefore, that a brooder is not efficient unless provision is made to allow for good ventilation.

Chickens can be reared on floors without frames, but the most successful results are obtained only where at least three to four inches of good, dry litter are provided under the brooder. In these days it is general to find a reduction in the quantity of bedding material on the score of expense, and in such cases the frame system is strongly recommended.

Construction

Fig. 1 illustrates the frame made in two sections, 7ft by 3ft 6in each, which, when locked together with metal clips or hook fasteners, make a complete frame 7ft by 7ft. The advantage in having this frame in two sections will be readily realised by those experienced in the use of frames for chicken rearing; it facilitates dismantling for

cleaning purposes while the brooder is in operation. These frames can also be used for temporary hurdles for grading pens when not in use under the brooder. The frames are constructed with light 3in x 1in timber on edge, except the 12in square hole in the centre, which is made of 1½in x 1in timber and kept flush with the top edges to allow a space of 1½in between these and the floor.

The dotted line between the centre and outer edges of the frame is a light metal rod about ¼in thick let into the top edges of the 3in x 1in, which prevents sagging of the wire covering in the wider parts of each division of the frames, and makes a strong construction. The top edges of the cross and diagonal 3in x 1in are better chamfered on both edges, which lessens the resisting area for collection of excrement, and assists in easy cleaning, as illustrated in Fig. 7.

The frames are covered with ¼in wire netting or, better still, ½in woven mesh wire. The 1ft square hole in the centre is left uncovered, as shown in Figs. 3 and 4, and a ¼in mesh wire circular guard is placed in this hole or lamp-well, the four corners of which are blocked off with plywood or other suitable material.

Assembling the Frame and Brooder

In assembling the frame and brooder, cover the rest of the frame on which the canopy stands with a single thickness of sacking and about 1½in of bedding material on top of the sacking.

It is advisable to have a metal hoop about 2in high around the base of wire mesh lampguard to prevent the chickens from working the litter into the lamp-well or heating compartment. The top of the lamp guard is covered with a metal plate, which diffuses the air and warmth out through the ¼in wire mesh guard into the brooder.

Place the canopy in position over the lamp or heater, and then a guard fence around the canopy. This fence can be in three sections for ease of handling, and should be from 12in to 15in high, allowing at least 9in clearance all round between it and the canopy.

Fig. 2 is a plan showing the assembled brooder and circular guard fence in position. Remove the litter which is outside this fence and fold the corners of the sacking back to expose the wire netting on the corners of the frame. When the brooder is in operation, fresh air is drawn in through these corners and passes under the chickens in each compartment of the frame and so to the heater at the centre, where it is warmed and dispersed over the chicks. As fast as this air rises, fresh air enters the brooder to replace it. This circulation of air prevents accumulation of moisture on the floor under the frame, and supplies the desired ventilation.

As the chickens grow, the circular fence should be enlarged and the bedding material gradually dispensed with. The sacking should be folded back a little at a time until the chicks rest on the wire netting, except for a strip of sacking about 1ft wide, which

should be retained round the heater well. This aids the circulation of fresh air, and also gives the chickens an extra warm place when they feel the need for a quick warm-up.

It usually takes three to four weeks to work the chickens on to the plain wire netting, and this change must be made gradually to harden the chicks off. The guard fence should be retained in the front of the brooder to shield the hover from draught until the chickens are at perching stage.

Electric-heated Brooders

Fig. 3 illustrates a brooder heated with an electric radiator element, using a 500-watt element for the first week and then changing to a 300-watt size. Some poultry-keepers use a 300-watt long electric radiator globe for heating, and both systems have given successful results. Figs. 5 and 7 show the frame made without the square well, and this type of frame is designed for the canopy or square hovers heated above the chickens either with globe or electric wire elements.

The raised centre, shown in Fig. 7, is a bottomless iron cover standing on the wire netting; it is 7in square and 5in high, with openings on each of the four sides, 5in by 2in, over which ¼in mesh wire has been soldered.

Fresh air from under the frame can enter through these openings, but is not heated, as with central heated brooders. Electricity does not consume air, but gives the desired heat and dries the moisture in the atmosphere.

It should be remembered that a chicken's body contains 60 to 65 per cent. of moisture, and the results may prove harmful to the chickens unless some system of replacing fresh air containing moisture is provided. The arrangement illustrated for giving central ventilation overcomes any difficulties in this direction, and it creates a slightly quicker circulation and better way of disposing of impurities in the air under the brooder.

In conclusion, it should be mentioned that the use of the later methods of battery brooding chickens, giving the desired heat a free ventilation through wire floors and keeping the chickens in small numbers in more or less confined areas to begin with, has amply demonstrated the above points and the simplicity of preventing many of the causes of brooder troubles. This method is very useful for starting young chickens during the first week or 10 days, but even the battery system requires intelligent operation.

APIARY NOTES— Continued from Page 224

Queens From Selected Stock

At any time when there is a honey flow go to the colony containing the selected breeding queen and insert a new empty comb with shallow cells into the centre of the brood-nest. Leave the comb there for two or three days or until the queen has laid a large number of eggs in the cells. Remove this comb before or immediately the eggs begin to hatch, and cut the comb away right up to the bottom row of eggs. The bees will, in most cases, prefer to build cells along this bottom edge.

Next, go to a strong colony and take away the queen and all combs containing eggs or brood, but be sure to leave several combs of honey and pollen with the bees. Then give this prepared colony the frame of eggs from your breeding queen. The bees will do the rest. If it is desired to save the queen removed, she may be given a frame or two of brood with

adhering bees and placed into a hive to start a new colony. In about six days after the queen-cells are capped, they should be removed and given to colonies to be re-queened after the removal of the old queen

Grafting Method

Where hives are kept in large numbers or queens are raised for sale in large numbers, the grafting method should be employed. This, however, requires a great deal more skill and practice than other methods. Beekeepers are advised to get in touch with the Apiary Instructor for the district when requiring instruction in this method of raising queen-cells.

The preparation of suitable candy for queen introduction and mailing purposes will be dealt with in next month's apiary notes.

—T. S. WINTER, Senior Apiary Instructor, Wellington.

—E. C. JARRETT, Poultry Instructor, Auckland.

N.Z. Federation of Young Farmers' Clubs



Edited by S. Freeman, Dominion Organizing Secretary

Overseas Y.F.C. Members Form Club in Egypt

Contributed by
TROOPER R. C. ASHBY.

Div. Cav. Y.F.C. (O'seas)...
2nd N.Z.E.F.,
G.P.O., Egypt,
April 29, 1940.

Dominion Organising Secretary,
N.Z.F. of Y.F.C.,
Wellington.

Dear Sir,—

This brings to you greetings from members, past and present, of various clubs now serving with the 2nd Div. Cav. Regt. 2nd N.Z.E.F. in Egypt, who have met primarily for the mutual good fellowship and for the interest that is so characteristic of our Y.F.C. Federation, plus a desire to retain contact with our headquarters, while serving overseas; and further, subject to the latter's approval, we have formed ourselves into a club within our Regt. and desire to affiliate with the parent body.

Wherever possible, and with the aid of local Agricultural Departments, we propose to organise tours of interest in farming in whatever countries we may be serving.

The following are club members who attended our first meeting and clubs to which they belonged:—

Tpr. K. Phillips (Urenui); Tpr. T. Lawry, Tpr. J. Watson, Tpr. C. Eyrie, Tpr. G. Mandino, 2/Lt. J. Wynyard (Te Awamutu); Tpr. H. Gilbert, Lt. H. Capamagian, Cpl. A. G. Spedding, Cpl. P. O. Ramsbotham, Tpr. C. Granger, Sgt. R. J. Walford (Kati Kati); Tpr. R. C. Ashby (Edgecombe); Tpr. P. Garland (Gisborne); L/Cpl. J. A. Barnes, Tpr. B. Dobson (Master-ton); Tpr. P. H. Fullerton-Smith (Hunterville); Tpr. P. Andrew (Poverty Bay); Sgt. T. Conway, Tpr. M. E. Hammond, Tpr. D. Dick (Seddon), Tpr. L. Butt, Tpr. D. P. Matthews (Flaxburne); Tpr. W. Simms (Amuri);

Tpr. J. Dalton, Lt. W. Handley (Rahotu); Tpr. T. B. McNeil (Takapau); Sgt. D. Ormond, Cpl. S. Morrin (Waipukurau); Tpr. G. J. von Dadalszen (Alfredton); Tpr. R. Laudon-Lane, Tpr. G. D. Stronach (Marlborough); Tpr. R. H. Thevenard (Kimbolton); Cpl. H. J. Lane (Tauranga); Tpr. A. R. Abraham (Taihape); Lt. M. L. Adams (Blenheim); 2/Lt. P. Crisp (Horowhenua); Cpl. B. A. C. Tennent (Massey College Staff).

Colonel C. J. Pierce, of Kihi Kihi, was elected patron of our club, and we are already greatly indebted to him for the wholehearted support and assistance he has given us.

The following were elected as committeemen:—Chairman, Sgt. T. Conway; deputy chairman, Tpr. C. Eyrie; secretary, Cpl. B. A. C. Tennent; treasurer, Lt. M. R. Adams; committee, Tprs. R. H. Thevenard, A. R. Abraham, and R. C. Ashby; advisory president, Lt. H. Capamagian.

From time to time reports of our trips will be forwarded to you, and we should be very grateful if you could forward regular copies of the "Journal" to Colonel Pierce and six copies to us for distribution among our members.

Yours faithfully,
(Sgd.) B. A. C. TENNENT,
Hon. Secretary.

Visit to Egyptian Agricultural Station

A VISIT was recently paid by the Div. Cav. Y.F.C. Overseas to the Horticultural Section of the Egyptian Ministry of Agriculture and the Cotton Research Bureau at Gezira.

Cotton

Mr. Brown, who is second in charge of the Cotton Research Bureau, conducted our party of some 50 Y.F.'s representative of more than 20 clubs in New Zealand over the 70 acres of land allotted by the Egyptian Government to the Horticultural Research Department.

We were told that the work of the station was primarily to test and produce better seed and greater crop

yielders for the producer, and secondly to recommend proven seed to the producers and thus enable them to market a higher quality material. Having given us an idea of the work of the department, Mr. Brown proceeded to show us cotton seed and plants in their various stages of growth. He then took us into a building where a Jinny was demonstrated to us, a Jinny being a machine through which the picked cotton is passed and is subjected to seed extraction.

The cotton at this stage is ready for carding, a process whereby the lint is combed and the strands laid parallel in addition to being cleaned of rubbish and dust. The cotton now passes through several reducing machines

and emerges from the last in the finished single strand, which is tested for strength in the laboratory by mechanical means. The department has now found out all there is to know

about the particular brand which they have been handling, and according to the test results either recommends or rejects the brand.

Mr. Brown stated that for the department to recommend a new brand of cotton the yield must be 10 per cent greater than its predecessor. Fertility at present is 98.4 per cent. Egyptian cotton is the finest in the world, being very silky and of regular staple length. Only cotton grown under irrigated conditions, as in Egypt, can attain the high quality which is reached in this country.

Cotton is irrigated about every 12 days according to the requirements of the crop and the soil dampness. Of course, there is the inevitable blight, which in this case is called the "boll-worm." Parents, very similar to codlin moth, lay eggs, which are very minute and transparent. The grub is hatched from eggs found on cotton leaves, turns itself into crysalis, and emerges as moth, feeding all the time on the green of the plant. If the plant is attacked very badly it will be eaten completely. There is only one method at present known to protect the crop, and that is early sowing, which does not entirely eradicate the pest, but tends to mature the crop before the pest gains too great a hold.

Wheat

The department also has a large area in wheat. In this area we saw wheat crops from every known country in the world being grown. We New Zealand farmers were certainly astounded to see the number of varieties, not having known previously that so many existed. In Egypt there are 20,000 Government farms in wheat or approximately 1½ million acres yielding 31½ bushels per acre. The average annual quota is 46 million bushels.

There are three main varieties grown here:—Hindi, Dacre, and Baladi. Of the Hindi, approximately 1 million acres is grown, the remainder being Dacre or Baladi. There is no import or export of wheat. The Hindi wheat is very like the New Zealand Tuscan. The Baladi or native wheat is a good yielder, and will grow under practically any Egyptian conditions. It is not a good quality wheat, but is good enough for the native requirements, as there is no demand for high quality goods among them.

The farmers are not as interested in wheat improvements as in cotton, because wheat does not bring them the same sterling returns. The usual rust trouble is experienced here in some varieties, but we saw some varieties which were entirely free from rust, being grown right next to the affected ones.

Wheat is sown in November—2½ bushels per acre—by hand. It is irrigated at the time of sowing, and thereafter once a month until May when it is harvested, again by hand. Wheat is known as a winter crop.

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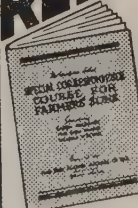
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Stock

We were shown the stock under the supervision of Dr. Khisim, a very able man and most interesting to listen to, especially when speaking on horses. He had several Arab horses which he very kindly paraded for us. Being of a cavalry unit, we certainly appreciated the grace of movement displayed by these animals.

The Egyptian dairy cow is the gamouse, or better known as the Indian water buffalo. Its yield is averaging about 8 per cent, butterfat. The animal is a very large one, and is a very good beef carcass as well as a good milker. The department is very interested at present in Shorthorn crosses, which so far have increased milk yields by 1000 lb. Summer feed is the greatest difficulty in Egypt.

Baseem is fed green in winter, when it grows, and is used as dry feed for summer. Baseem is not unlike the lucerne we have in New Zealand, giving several cuts per season. There is no all-year-round green feed.

We have in view several visits to other places in Egypt of an agricultural interest, and will from time to time furnish reports of our visits.

South Taieri Club's Ploughing Match



Upper left.—A general view of some of the competitors in the tractor classes. *Upper right.*—A tractor nearing the finish in the double digger class. *Lower left.*—A Wilson's best turned out team being driven by A. Cowan, the best teamster. *Middle.*—One of the club members straightening his furrow with the tractor and plough still working. *Lower right.*—The best turned out team with harness in everyday use, owned by Allison Bros.

THAT Otago and Southland are the homes of New Zealand's best teams and ploughmen is well known throughout the country. It is therefore not surprising that the South Taieri Club should follow up last year's very successful ploughing match with another this year. The membership of the club is not great, but the ploughing match committee has each year thrown its full weight into the work of organising and conducting this activity, and the results they have

By S. H. SAXBY
District Secretary, Dunedin.

achieved each year speak volumes for the energy and enthusiasm of the club members.

This year the match was held on July 20 on the property of Mr. F. Heenan, of Maungatua, and although, as was expected, the attendance was

not as great as last year, some 350 persons from the surrounding districts attended and saw some excellent ploughing in the many classes.

As a result of the day's effort, the Otago Patriotic Council, benefited by more than £18, which represented most of the gate takings for the day.

Although the majority of the competitors were Taieri ploughmen, the presence of a number of high-cut men from South Otago and Southland added further competition. The interest of

the Young Farmers did not cease with the actual running of the match, but was carried on to the point of actual competition in a number of the classes.

There was ample evidence that many competitors had made a special effort to prepare their teams and harness up to the traditional ploughing match style and standard. While some of the older hands may say that a ploughing match is no place for a novice ploughman, very good performances were put up by several of the younger competitors.

Excellent lunches and afternoon teas were provided and served at a marquee by a number of ladies from the South Taieri district, and the profits were handed over to the Patriotic Fund.

At the conclusion of the match Mr. J. Richards, the club chairman, thanked all who had in various ways helped to make the match such a success. The prizes, of which there was a considerable number, were presented by

Mr. S. H. Saxby, honorary secretary of the Dunedin District Committee.

The Bremner Memorial Challenge Cup for the champion ploughman was awarded to Mr. W. G. Miller, of Wendon, and the South Taieri Club's Challenge Cup for most points in the tractor class went to Mr. W. Lockhart, a member of the Milton Young Farmers' Club.

The following is the complete list of prize-winners:—

Horses, high-cut.—First place and best feering, best finish, and straightest ploughing, W. G. Miller; second place, M. V. Dickie.

Two or three furrow plain ploughing with horses.—First place and best feering, best finish, and straightest ploughing, W. Bissett; second place, A. Lowery; third place, A. Cowan.

Two or more furrows, plain ploughing for tractors.—First place and straightest ploughing, H. Morrison;

second place, J. Wither; third place and best finish, K. D. Townley; best feering, J. Beattie.

Single digger, horses or tractor.—First place, best feering, best finish, and straightest ploughing, Allison Bros.; second place, R. Morrison; third place, S. Kenney.

Double digger, horses or tractor.—First place, best feering, best finish, and straightest ploughing.—W. Lockhart; second place, J. McCallum; third place, J. Cameron.

Best junior ploughman, R. Jury; best teamster, A. Cowan; best turned out team, A. Wilson; best gelding, Allison Bros.; best pair of mares, A. Wilson; best turned out team with harness in everyday use, Allison Bros.

Messrs. A. Montieth, Papakaio, and P. Hunter, Studholme, were the judges of ploughing; Mr. A. Carruthers, Middlemarch, judged the horses and harness.

Wanganui District Debating Contest

A. R. DINGWALL, District Secretary, Wanganui.

THE Wanganui District Y.F.C. Debating Competition, which has been in progress since last June, was advanced one stage further recently when the final of the southern zone was concluded by a debate between teams from the Bulls and Marton Clubs. The results of the first round of the competition in this zone resulted in wins for these clubs over the Westmere and Hunterville Clubs respectively in spirited and closely-contested debates.

The teams for the recent contest, which was held in Marton Jockey Club's Room, Marton, were:—

Marton Club: M. Morrison (leader), W. Gray, and F. Smith.

Bulls Club: F. Thorby (leader), C. B. Anderson, and S. H. Last-Harris.

The subject, "Mixed Farming v. Specialised Farming," offered ample scope for interesting discussions and debate, as a result of which the judge, Mr. J. Caithness, awarded in favour of the Marton team, which sponsored the cause for "Mixed Farming." In summing up the awards, the judge pointed out where speakers had scored or failed to score.

Mr. S. Freeman, Dominion Organising Secretary, commented upon the good showing put up by both teams, and emphasised the benefits which were to be derived by rival although

friendly discussions and debating on subjects which have an important bearing upon the livelihood of those participating in the debate and of its audience.

The final for the District Competition, in which the Mangaweka Club team, winners of the northern zone, will compete against the Marton team, is scheduled to take place this month,

and arrangements are in hand for the staging of this contest in Hunterville.

The award to the winners of this competition is a Challenge Cup donated by Mr. Hugh Kimpton, former secretary of the Marton Y.F.C. and a member of the Wanganui District Committee, who is now in training with the Air Force.

Alton Club's Field Day And Social

T. W. BOYCE, Hon. Secretary, Alton Club.

THE Alton Y.F.C. recently held a very successful field day on the property of Mr. G. Scown, Manutahi. Demonstrations were given on pedigree Jersey cattle by Mr. S. G. Morgan, Mangatoki, a prominent Taranaki Jersey breeder, and on Clydesdale horses by Mr. N. Hannah, Hawera. The visitors were entertained to afternoon tea by Mrs. Scown.

The club chairman, Mr. C. Penny, thanked Messrs. Morgan and Hannah for their demonstrations and Mr. Scown for the use of his cattle, and also Mrs. Scown and her helpers for the afternoon tea.

On the same night the club held its annual parents' and friends' evening, which was spent in cards and dancing. The cards were conducted by T. Boyce, and the winners were Mrs. R. Forbes and Mr. T. Hurley, consolation prizes being won by Mrs. H. Cate and Mr. G. Scown. Music for the dancing was played by Mrs. Johnson.

During the evening Mr. C. Penny, on behalf of the members, thanked all who had helped and supported the club during the year, and stated that it was mainly due to their keen interest that the club was in its present strong position.

Waituna Club's War Effort

IVAN H. OLD, Chairman, Waituna Y.F.C.

AS a number of farmers in the district were unable to get men to do their crutching, the Waituna Y.F.C. decided on a plan by which they could help the farmers.

Some 15 or 20 members who could do the work but were in permanent positions handed in their names to the

secretary, who called on them in turn to assist the local farmers and get the work done.

As the members were in permanent positions they could not do the work during the week, so they had to work on Saturdays and Sundays. They sacrificed a little pleasure, and were able to do someone a good turn.

We feel that this spirit is necessary in these times, when so much increased production is needed, and think that it could be carried out in many other ways and so assist the farmer who is short handed because of the war.

Among the Clubs: Reports on Activities

Western Southland.

Dipton.—Arrangements for club concert to be held. An address was given by Mr. W. L. Hardbord, Department of Agriculture, on "The Farmer in Wartime."

Drummond.—Arrangements made for a visit from the Woodlands Club. The speaker for the evening was Mr. Gardiner, who lectured on "Ploughing."

Thornbury.—General. Mr. Cawthron, Waitaki, gave a most interesting address on "The Correct Handling of By-products of the Farm."

Eastern Southland.

Balfour.—Proposed football match and debating contest with the Five Rivers Club discussed. Debating team selected to represent the club in the forthcoming Eastern Southland debating competition. A talk entitled "Pasture Management and the Growing of Turnips for Seed" was given by Mr. W. Faithful, Department of Agriculture.

Five Rivers.—General. Address on "State Forestry" by Mr. J. F. Field. Field day held on Mr. A. L. Drummond's property, there being an attendance of 30, including 12 members of the general public. Demonstrations included "Stud Sheep and Cattle" (Mr. Alex Drummond) and "Pruning of Fruit Trees" (Mr. Burrows).

Otama.—General business. Mr. O. J. Howells spoke on "Laws Affecting the Farmer." During his address he showed the superiority of British justice over the legal systems in other countries.

South Otago.

Clinton.—General business. A programme was drawn up for the year, and a number of speakers selected for forthcoming meetings.

Stirling.—General. The speaker for the evening was Mr. J. G. Anderson, who gave a talk on "The Story of the Electric Motor," and later described the method of dairy farming in Denmark.

Central Otago.

Roxburgh.—E. J. Dunlay appointed acting-secretary, while the club secretary, Mr. L. A. Henderson, is undergoing training in the Territorial Forces. The lecturer for the evening was Mr. E. Jeffery, who spoke on "Vitamins and Their Benefits to Both Human Beings and Stock."

Dunedin.

Palmerston.—A talk by Mr. J. Davis, an officer of the Dunedin Fire Brigade, on "The Fire Service and Its Work."

North Otago.

Enfield.—A general discussion on "The War Effort as it Affects the Y.F.C. Movement."

Five Forks.—An open meeting held. Films of an agricultural nature were shown.

Hampden.—Mr. A. White, vice-chairman, read a paper on "Farm Finance" prepared by Mr. B. B. Walton, Oamaru. Members attended a lecture arranged by the Farmers' Union at which Mr. D. J. Ross outlined the work of the Primary Production Council. This was followed by a lantern lecture by Mr. T. A. Sellwood, Department of Agriculture, on "Clovers and General Pasture Management." At a previous meeting Mr. Sellwood showed the Department of Agriculture's talkie film on "Increased Production," besides a number of other films of topical interest.

Waitaki-Hilderthorpe.—General business. A film display by Mr. T. A. Sellwood, Department of Agriculture.

South Canterbury.

Albury.—Talks were given by Mr. P. Kidd on "Farming Forty Years Ago," and Mr. O. Wreford on "Lincoln College." At a previous meeting two debates were held: "That the Tractor is Indispensable to Farming" and "That Top-dressing is Advantageous."

Arno.—Talk entitled "Points to Consider When Purchasing a Farm," by Mr. J. C. Hay.

Cannington-Cave.—Arrangements for dance. Discussion on scheme of assistance for farmers of the district in times of illness, rush periods, or any emergency, when labour is scarce during the war. Debate "That an Immigration Scheme Would be Beneficial to New Zealand," was won by the affirmative side by 35 points to 34.

Geraldine.—Arrangements for club debate. Mr. P. H. Davis gave a lecture on, and a practical demonstration of, "Plumbing." At a previous meeting members contributed short prepared speeches on farming topics.

Hunter.—Centennial tree-planting discussed. General business.

Millford.—Talks by club members, "The White Butterfly Parasite" (R. Bisdee), "Subterranean Clover" (B. Palmer). At previous meeting two debates were held, Mr. G. Mulligan acting as judge. In the first, "That the Practical Farmer has Contributed More to Farming Than the Scientist," the affirmative (R. Palmer, L. Livesey, and T. Crossman) were narrowly defeated by the negative team, consisting of R. Bisdee, G. Crossman, and N. Palmer. The negative side was also placed first in the next debate, the subject of which was "That the Development of Unimproved Land in New Zealand Will be of Greater Benefit in Increasing the National Production Than to Intensify the Production of Land at Present Under Cultivation." The teams were: Affirmative (G. Lyall,

A. Archibald, and A. Johnson); negative (J. Dale, J. Woodhead, W. McCormick).

Waihaorunga.—Talk by Mr. Lukey (Department of Agriculture) on "Supplementary Feeding of Stock." At a previous meeting Mr. Copland, Department of Agriculture, lectured on "The Management of a Farm."

Mid-Canterbury.

Hinds.—Mr. H. L. Chisnall of the Hinds Farmers' Union, congratulated the debating team on winning the inter-club debate.

Mayfield.—General business. Mr. J. Boyce, of the Associated Motorists' Petrol Company, gave a lecture and demonstration on "Oils."

Christchurch.

Darfield.—Arrangements for annual ball. Debating team selected. Decided to give half the profits of the dance to the Red Cross Fund.

Ellesmere.—Football match arranged with Darfield Club. Dr. Burns, Lincoln College, spoke on "Fertilisers and Soil Fertility."

Springston.—General. Social evening held. **Teddington.**—Tree Planting scheme discussed. Lantern lecture by Dr. R. A. Falla on "Antarctic Exploration."

North Canterbury.

Amuri.—Annual ball arrangements finalised. Address by Mr. J. R. Little, Hawarden, on "Sheep."

Cust.—Decided to hold a hare shoot in conjunction with the Farmers' Union. A question and answer evening held.

Oxford.—A talk entitled "Lucerne Growing," by Mr. A. S. Nash, Department of Agriculture.

Scargill-Omihiri.—Tree Planting Scheme discussed. Annual ball arranged. Mr. E. P. Spier addressed the meeting on "Common Complaints of Farm Animals."

Nelson.

Dovedale.—General. Field day to be held. At a previous meeting talks were given as follows:—Mr. Skinner, Department of Agriculture, "Feeding of Livestock" and Mr. D. Merry, Department of Agriculture, "Manures for Top-dressing."

Wairarapa.

Alfredton.—Radio lecture to be prepared by J. Shircliffe and A. Heckler for broadcasting over 2YA. The speaker for the evening was Mr. M. Finlayson, who spoke on "Grasses and Seeds."

Carterton.—The meeting selected M. Knutson and J. Milne to give a radio talk. A challenge was accepted for a friendly debate with the Featherston Club. Mr. M. Armstrong,

Department of Agriculture, spoke on "The Winter Feeding of Dairy Cattle."

Greytown.—Tree planting to be proceeded with in the near future. A talk, "The Feeding of Dairy Cattle During the Winter Months as a Means of Resisting Disease" was given by Mr. M. Armstrong, Department of Agriculture.

Martinborough.—Club dance held. Mr. James gave a resume of the Federation's annual general meeting held recently in Christchurch. Supper was provided after the meeting.

Manawatu.

Apiti.—Annual dance and a field day to be held. The profits of the dance to go to the Patriotic Fund. Mr. J. A. Osborne gave a talk on "Farming in North Auckland." At a previous meeting Mr. Nielsen spoke on "Dairy Production."

Bunnythorpe.—General. Mr. S. Freeman, Dominion Organising Secretary, addressed the meeting and also showed a number of sound films of an agricultural nature.

Feilding.—Shearing field day to be held in order to encourage learners. As R. W. Durrant has joined the Air Force, N. Hansen was elected club chairman in his stead. Mr. H. A. Seifert gave a talk entitled "Sheep on Dairy Farms."

Fitzherbert.—General business. Lecture delivered by Mr. L. Earl, Department of Agriculture, on "Sugar Beet."

Halcombe.—Dance to be held. Mr. G. Judd was elected president. Lecture on "Fencing" by Mr. R. D. Batchelor. At a previous meeting Mr. E. P. Neilsen spoke on "Dairy Production."

Johnsonville.—General. Mr. G. S. Robinson, Department of Agriculture, spoke on "Grass Seeds and Pasture."

Kairanga.—A talk on "The Herd Improvement Scheme" was given by Mr. E. P. Neilsen.

Kimbolton-Kiwitea.—Final arrangements for stock drive. Discussion on shearing competitions. Mr. L. Earl, Department of Agriculture, lectured on the "Growing of Sugar Beet for Feed and Seed." At a previous meeting Mr. Hill-Motion gave an address on "Animal Nutrition."

Levin.—Inquiries made as to what sheds would be available in which to instruct members in shearing. Members who attended Massey College course gave an account of the proceedings.

Opiki.—General items of business, including programme for Y.F.C. radio lectures. J. Wilson gave an address on "The Recent Y.F.C. Tour of the South Island."

Oroua Downs.—General. Discussion on the club's recent field day. Mr. L. R. Renouf, Department of Agriculture, spoke on "Orchards and their Management."

Otaki-Te Horo.—General. A talk on "Cropping" was given by Mr. E. Jensen.

Pohangina Valley.—Arranging for shearers for the forthcoming season. Mr. W. W. Gibb spoke on "Export Mutton and Beef."

Rongotea.—Short discussion on shearing lessons. New member elected. Lecture by Mr. E. P. Neilsen, N.Z. Dairy Board, on "The Feed Supply as it Affects the Production and Health of the Dairy Cow." An address was also given on "Sire Survey and the Effects of Selective Breeding."

Tokomaru.—Proceeds from dance (amounting to £4 10s) donated to Red Cross Fund. A talk on "Dairy Herd Improvement" was given by Mr. E. P. Neilsen, of the N.Z. Dairy Board.

Waituna.—General. Mr. S. Freeman, Dominion Organising Secretary, spoke on "The Y.F.C. Movement," and showed a number of interesting films of an agricultural nature.

Whakarongo.—General. Mr. A. Crawford elected as representative on local Patriotic Committee. Mr. S. Freeman, Dominion Organising Secretary, showed a number of agricultural films to the meeting.

Wanganui.

Hunterville.—General. A lecture entitled "Lambing and Calving Troubles," by Dr. Findlay, veterinary surgeon.

Mangaweka.—Arrangements were made for the final of the Wanganui District Debating Contest in which this club meets Marton for the championship. The club's radio talk was then discussed. The speaker for the evening was Mr. G. McDermid, who lectured on "Horse Breaking."

Waimarino.—The clubs to plant trees in the Waimarino Show Grounds as a Centennial memorial. Arrangements made for a trip to the Chateau Tongariro. Mr. Gardiner gave a lecture based on the book "Famine in England," by Lord Lymington.

Westmere.—Seven-a-side football team selected. Tree planting discussed. Special meeting to be held for debating purposes. Mr. A. R. Dingwall, Department of Agriculture, spoke on "The Provision of Winter Feed" and also on "Electric Fences."

South Taranaki.

Alton.—Two teams entered for football tournament at Eltham. A donation of £5 5s was made to the Red Cross Fund. Field Day to be held. C. Palmer, a club member, gave a motion picture display.

Hawera.—Mention was made of the club's exhibit at the Hawera Winter Show. A talk entitled, "The Importance of Herd Testing to the Dairy Industry" was given by Mr. Knowles, Supervisor of Group Herd Testing in Taranaki.

Central Taranaki.

Cardiff.—Three members were appointed to prepare speeches on specified subjects. A talk was given on "A Dutch Pig House," which was followed by a general discussion.

Pukengahu.—J. Best elected secretary for district "War Effort Production Committee." Discussed the preparation of a radio talk for 2YA on "The Maintaining of a Dairy Herd."

Toko.—Club dance to be held. Mr. J. B. Richards, Stratford, addressed the meeting on "Bringing Back Hill Country to Production." A general discussion followed.

North Taranaki.

Inglewood.—Decided to hold another dance to raise funds for the Patriotic Society. A talk entitled "Pig Farming in General" was given by Mr. C. H. M. Sorensen, Taranaki Supervisor of the Pig Council.

Mangorei.—General. Social evening.

Urenui.—R. Darke elected president in place of G. Sulzberger, and J. Sulzberger was elected to the executive in place of A. Phillips.

Central Hawke's Bay.

Hastings.—Wairoa Club challenged to a debate. Mr. W. G. Brownlie, Wairoa, spoke on "Y.F.C. Activities and Policy."

Takapau.—Arrangements for dance to be held in aid of the Red Cross Funds. Mr. F. J. S. Holden, Department of Agriculture, gave an address on "Increased Production."

Northern Hawke's Bay.

Meaneane.—Report on successful farewell dance and presentation to three club members in the Third Echelon. The club's delegate, L. L. Griffiths, submitted a comprehensive report on the Federation's annual general meeting. Mr. R. P. Hill, Department of Agriculture, lectured on "Sugar Beet."

Nuhaka.—Sports meeting to be held in October. Mr. J. Small gave an interesting account of the various places he visited on his recent tour.

Poverty Bay.

Gisborne.—A report of the recent club dance showed a profit of £25, half of which is to be donated to the Patriotic Fund. Three new members enrolled. Mr. N. H. Hull lectured on "A Review of England and Germany."

Te Kuiti.

Mokauiti.—Field day to be held. Mr. S. Freeman, Dominion Organising Secretary, addressed the meeting on "The Y.F.C. Movement."

At the conclusion of his talk Mr. Freeman showed films of an agricultural and topical nature.

Otorohanga.—General. Short address by Mr. S. Freeman, which was followed by a talking picture display. A field day was held recently on the Otorohanga Domain, when trees were planted as a Centennial Memorial.

Eastern Bay of Plenty.

Waimana.—General. Motion picture display was given by Mr. Walker.

Western Bay of Plenty.

Kati Kati.—Arrangements for annual ball. Mr. A. V. Allo, Department of Agriculture, lectured on "Control of Feed Flavour."

Paengaroa.—Arrangements for club's birthday celebrations. E. Pinker and A. Walter gave a resume of the farming course at Ruakura, which they attended.

Te Puna.—Dance to be held in aid of Patriotic Fund. A talk entitled "Control of Feed Flavour," was given by Mr. A. V. Allo, Department of Agriculture.

Te Puke.—Members asked to bring a prepared speech for next meeting. Two new members elected. J. Nichol, club chairman, spoke on the "Short Course of Farming at Ruakura."

Waikato.

Hauraki.—Plans were submitted for a cropping competition. An effort to be made to increase the club membership. Impromptu speeches by members present.

Auckland.

Clevedon.—General. Mr. Clarke, principal of Wesley College, gave a lecture on "Tree Planting and Shelter Belts."

Franklin.—General business. Interesting pictures shown and talk given by Mr. Woodyear-Smith entitled "Down the Waikato River and Across the Tasman."

Harrisville.—The sum of £2 13s realised on card party donated to Patriotic Fund. New member enrolled. The speaker for the evening was Mr. D. W. Corby, Consulting Officer of N.Z. Dairy Board, who spoke on "Herd Improvement."

Hunua.—A club member, W. Wellocott, gave a short talk on "The Usefulness of Eucalyptus Trees on Farms as a Means of Filling Waste Corners." Mr. H. Woodyear Smith spoke on "The Urgent Need for More Bacon and the Y.F.C.'s Part in Increasing Production." He also showed films on Australian farming.

Mauku.—Club dance to be held. Mr. J. E. Bell, Department of Agriculture, spoke on "Winter Feeding of Stock." Debate, "Horses v. Tractors" held.

Warkworth.

Kaukapapa.—Report on recent dance. Field day to be held. Talks were given as follows: "Pampas Grass" (Mr. P. S. Syme, Department of Agriculture), and "The Y.F.C. Tour of Northland" (J. Hooper).

Whangarei.

Keri Keri.—General. Mr. Bailey spoke on "Import Control of Plants and Fruits."

Maungatapu.—General. A film display was given by Mr. E. B. Glanville, Department of Agriculture, one of the films shown being the Northland Centennial one.

Dargaville.

Marohemo.—Arrangements for club dance. A sports evening consisting of wrestling, boxing, and table tennis held.

Tangiteroria.—Dance to be held. Discussion by members on the best method of disposing of rushes. Field day held, there being an attendance of 23. Demonstrations included "Stud Sheep" and "Working a Sheep Dog" (J. Nash). R. Thornton demonstrated the method of "Breaking in a Young Dog."

Health Notes for the Farm

Contributed by the Department of Health

Rheumatism in Children Should Be Checked Early

IN one of his reports on the health of school children in Great Britain Sir George Newman stated that the prevention of acute rheumatism, in the first instance, and of its grave after-effects on the heart, is among the modern objectives of child welfare work, for this disease is one of the most disabling from which the child may suffer. It is responsible for much child invalidity, and produces a high mortality in later life.

Rheumatism is well known in temperate climes, and in this country we are by no means exempt from it; in fact, it is a most common disease. Rheumatism is rather a vague word. It is difficult to define, and is used to cover what is really a collection of different diseases.

In this article we are not going to consider the rheumatic pains, the arthritis, and rheumatoid conditions which are encountered among the middle-aged and the more elderly, for advice on such trouble is a matter for consultation with the family doctor.

Onset in Children

Let us consider this serious problem of rheumatism among children. The disease is one of school years, the onset as a rule, being between five and fifteen years of age. It is rarely found in babies and very young children. So the study of rheumatism begins in childhood, and at the very dawn of the illness.

Rheumatism may show itself in many ways. There may be an attack of acute rheumatic fever, that is to say,

the patient suffers from a very definite disease with severe pains, painful joints, fever, profuse perspiration, and the temperature is high. In most people, however, the first attack of rheumatism does not take this form, and it is so only occasionally in children of school age.

Among children the onset is more often insidious, vague, and indefinite. In many cases there is little or no joint affection, and fever may be comparatively light. In many cases the only symptom noticed during the onset of a severe rheumatic attack in a child are languor, pallor, and wasting, although extreme changes in the heart may have occurred. It is this characteristic of the rheumatic poison to do serious damage before being recognised that makes it essential not to minimise the importance of minor rheumatic manifestations in children. For instance, the popularly-named "growing pains" are rheumatic in origin, and indicate the need for care.

In other cases rheumatism will manifest itself as a form of chorea, that is to say, the child will make the strange jerky movements that are so often spoken of as "St. Vitus Dance." The jerky movements may be mild, and may be confined to one part of the body—the face, for instance, or the hands, or perhaps one arm, but they may be palsied and possibly severe. At the same time, there is usually a change in the disposition and the character of the child. He may be apt to become nervous, jumpy, and rather troublesome. The general health becomes poor, and there may be loss of weight.

What Should Parents Do?

What should parents do if they suspect their child is developing rheumatism? Every child who suffers from "growing pains" should be medically examined, and careful supervision of all slight ailments is advisable. It should be realised that the disease must be taken in hand early and that the child must have proper care in order to prevent serious consequences. Such children, especially in winter, should wear woollen garments **next to the skin**, care being taken to cover the extremities; warm stockings and watertight shoes are essential in bad weather. No child should be allowed to sit in school in damp boots.

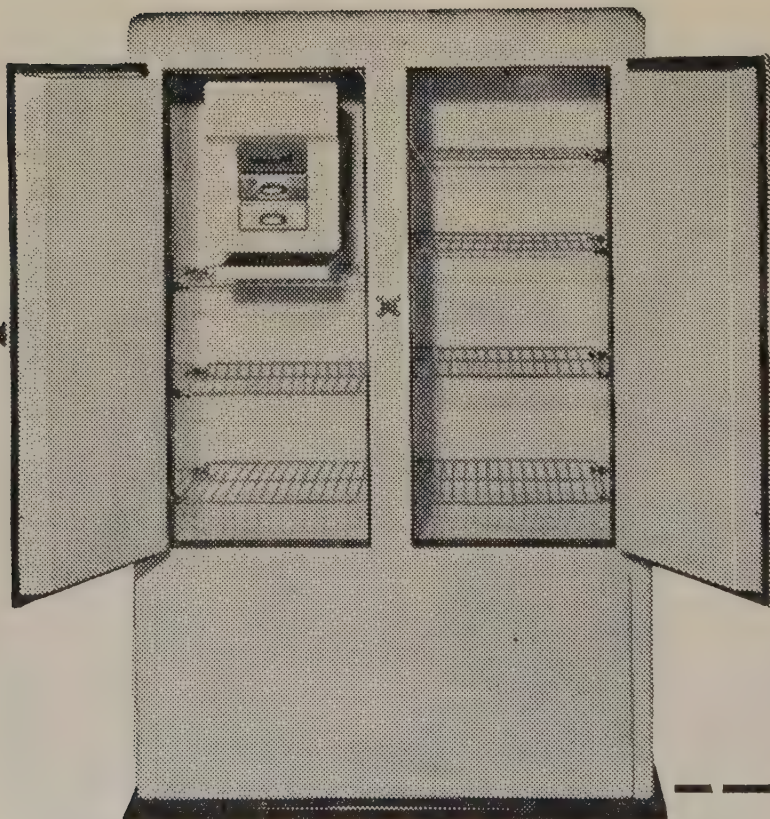
Clothing, although warm, should be light and loose, and undue exposure to wet and cold should be avoided. Residence in a dry climate, when possible, is beneficial. Bad social conditions, such as poverty, overcrowding, damp dwellings, insufficient food, which lower the resistance of the body, influence the onset of the disease. When we know life and look through the spectacles of experience we view with generous appreciation all valiant efforts to fight such factors which have disastrous effects on the body of the growing child.

The importance of rest, fresh air, and sunlight for all children cannot be exaggerated; for the rheumatic child they are doubly necessary if the weakened heart and nervous system are to become strong. "Truly the light is sweet, and a pleasant thing it is for the eyes to behold the sun." It has been well said that "Of all the flowers the human flower needs the sun the most." The details of such a child's life should be regulated by medical advice. It might be stated, however, that competitive or team games where the pace cannot be regulated to suit the individual are specially undesirable until convalescence has been established for some time. The injudicious use of cold baths has been known to develop rheumatism in a child.

(Continued on page 239.)

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The Farm Home and Kitchen

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How To Use Sour Milk To Save Cream of Tartar

BECAUSE we are unable to trade with practically all the world's wine-making countries, which produce cream of tartar as a waste product when grape juice is being fermented to make wine. New Zealand housewives are finding it difficult to secure the stocks of cream of tartar to which they have been accustomed. The result is that either we must bake less, or we must use more yeast, or we must use some other acid to substitute for cream of tartar. Perhaps it might be advisable to make use of all three of these alternatives, for they all offer some help.

Substitutes

Certain other acid salts, notably some of the phosphates, are used in commercial baking powders, but home substitutes are the acid foods, such as sour milk, vinegar, treacle, jam, dried fruit.

Before using any of these things it is necessary to understand something about the other ingredient in the baking powder—bicarbonate of soda, or baking soda as it is more commonly known.

The proportions between the cream of tartar and baking soda are 2 to 1, and every teaspoonful of ordinary commercial baking powders contains $\frac{1}{2}$ teaspoonful of cream of tartar, $\frac{1}{4}$ teaspoonful of baking soda, and $\frac{1}{4}$ teaspoonful of filler (starch). Therefore, 1 part of baking soda equals 4 parts of baking powder.

The starch is not for adulteration purposes, but is to absorb atmospheric moisture, which would make the cream of tartar and soda react and so be wasted before it could be put into any food, for once the two salts are dampened they begin to react together, and as soon as they are heated they react

strongly, the soda giving off a gas (carbon-dioxide) which makes the food become spongy and light. Even if heated alone in water, baking soda will give off carbon dioxide and turn into washing soda, which, as everyone knows, has a most objectionable taste, and which will turn food yellow in colour or make brown specks through it

It will be realised that if one does not use enough acid to react with all the soda some is left in the food to give the result just described. Therefore, one must measure soda very carefully and use a scant measurement rather than a full one.

Proportions

The following proportions will be found satisfactory:—

Acid.	Baking Soda.	Equivalent
		in Baking Powder.
	Teaspoons.	Teaspoons.
Cr. of tartar, 1 teasp.	Half	Two
Sour milk, 1 cup	Half	Two
Golden syrup, 1 cup	Half	Two
Honey, 1 cup	Quarter	One
Black treacle, 1 cup	Three-quarters	Three
Vinegar, 1 cup	Two	Eight

In very liquid batters and doughs sour milk may give enough acid to make it unnecessary to use any cream of tartar or baking powder, but in scones, for example, the acid from the quantity of milk used, plus the soda, does not give enough rising, so it is necessary to use a certain amount of baking powder as well. To find how much to add, allow 1 teaspoonful of baking powder for every one-quarter teaspoonful of soda to be used, and subtract this from the original amount of baking powder in the recipe.

Of course, by combining sour milk, treacle, or other acids in one recipe,

the quantity of soda can be so increased as to make it unnecessary to use any baking powder.

Really Sour Milk Is Necessary

To fulfil its purpose as a substitute for cream of tartar, sour milk must be really sour—that is, it must be thick. If you find that the milk has slightly turned, or if you know that it will

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turn sour before you can use it, take it from the refrigerator or safe where you may keep it and put it in a warm place in the kitchen, at the same time pouring it from the bottle or jug into an open bowl. The reason for doing this is that the milk will sour more rapidly and thus have a better flavour than if allowed to sour slowly at a low temperature. Put a muslin over it to keep dust from falling into it.

What causes the milk to sour is the growth of bacteria which use up the sugar in the milk and form an acid (lactic) which separates the protein from the water. If these bacteria grow slowly others will also grow, while if they grow rapidly the acid forms quickly enough to prevent the growth of others and thus produces a more desirable product.

Sour milk should be used for cookery purposes soon after it "sets," and should not be allowed to become old. In using it, one must be very sure to measure equal portions of the curd and the whey. The surest way of doing this is to break up the curd and mix it thoroughly by the use of a rotary egg beater. Another reason for this beating is that the curd, when in small pieces, blends more readily with other ingredients used and gives a better texture to the finished product, especially if it is in the nature of a flour mixture.

Adding the Soda

There has been much discussion as to whether the soda required in sour milk recipes should be added to the sour milk separately or in combination with the other dry ingredients. There may be reasons for doing either way, but usually it is better to use the latter method. The reason for this is evident if you stir a quarter of a teaspoonful of bicarbonate of soda (baking soda) into half a cupful of sour milk. The bubbles which form and then burst, allowing the milk to become "flat" again, contain a gas which causes a flour mixture to rise when subjected to heat. If this gas forms in the dough, less of it will escape before the baking than if the soda is combined first with the sour milk and added to the other ingredients later.

To guard against brown specks, sift the flour and soda together two or three times so that the particles of soda are very finely divided. The following recipes without baking powder or cream of tartar, although they show various methods of combining soda and other ingredients, have all been tested with most satisfactory results.

PIKELETS.

Flour, 1 cup; salt, $\frac{1}{4}$ teaspoon; sugar, 1-2 teaspoons; baking soda, $\frac{1}{4}$ teaspoon; egg, 1; sour milk, $\frac{1}{2}$ cup; butter, melted, 1 teaspoon. Sift dry ingredients together

very thoroughly (do two or three times to mix in soda completely). Add the melted butter to the beaten egg and milk, and combine with the dry ingredients. Cook in spoonfuls on a hot greased girdle.

BRAN GEMS.

Bran, $1\frac{1}{4}$ cups; flour, 1 cup; salt, 1 teaspoon; soda, $\frac{3}{4}$ teaspoon; sour milk, 1 cup; golden syrup, 1-3 cup; melted butter, 2 tablespoons; raisins, if desired. Combine dry ingredients, sifting the soda very thoroughly with the flour. Combine liquid ingredients and add to dry ingredients as quickly as possible; mixing only enough to dampen flour. Bake 15 minutes in a hot oven.

GINGERBREAD WAFFLES.

2 cups sifted flour; baking soda, $\frac{3}{4}$ teaspoon; salt, $\frac{1}{2}$ teaspoon; ginger, 2

teaspoons; eggs, separated, 2; golden syrup, 1 cup; butter, melted, 1-3 cup; sour milk, $\frac{1}{2}$ cup. Mix and sift dry ingredients. Combine well-beaten egg yolks and golden syrup; add to flour mixture alternately with sour milk, beating until smooth; add butter and fold in stiffly beaten egg whites. Bake in hot waffle iron, removing tender waffle from iron in quarters. Serve hot with apple sauce and bacon, or serve as a dessert with whipped cream flavoured with golden syrup.

BRAN BROWN BREAD.

Bran, 1 cup; sour milk, 1 cup; raisins, $\frac{1}{2}$ cup; golden syrup, 1 tablespoon; sugar $\frac{1}{2}$ cup; flour, 1 cup; soda, 1 teaspoon; salt, $\frac{1}{4}$ teaspoon. Stir the bran into the beaten sour milk. Add the raisins and the golden syrup, then the mixed and sifted dry ingredients. Fill

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OATMEAL COOKIES.

Oatmeal, ¾ cup; brown sugar, 1-3 cup; soda, ¼ teaspoon; salt, a pinch; cinnamon, ¼ teaspoon; lard, ¼ cup; milk, ¼ cup; flour for stiff batter. Mix the first five ingredients. Cut in the fat. Add the milk and flour. Drop from a teaspoon on a buttered baking sheet, one inch apart, and bake in a slow oven 12 to 15 minutes.

GINGER BISCUITS.

Lard, 1 cup; golden syrup, 1 cup; sour milk, coffee or water, ½ cup; brown sugar, 1 cup; salt, 1 teaspoon; cinnamon, 1 teaspoon; flour, about 4½ cups; vinegar, 1 tablespoon; ginger, 1 teaspoon; soda, 1 tablespoon. Mix all the ingredients together, using about 4½ cups flour or enough to roll out on the board. Bake in a hot oven. If water or coffee is used in place of sour milk, use only 1 teaspoon soda and add 1 teaspoon baking powder.

TRILBYS.

Dates, 1 lb; sugar, 1 cup; water, 1 cup; lard, ¾ cup; salt, ¼ teaspoon; sugar, 1 cup; sour milk, ½ cup; flour, 2 cups; soda, ½ teaspoon; ground oatmeal, 2 cups; almond extract, 6 drops. Stone and grind the dates and cook with the sugar and water for twenty minutes; cool and reserve for filling. Cream the lard, add the salt and sugar gradually, and then the beaten sour milk. Sift the flour and soda together, mix with the ground oatmeal and almond extract. Stir into the first mixture. Roll thinly, cut with cooky cutter and spread filling in the centre of each cooky; cover with another, pressing the edges together well. Bake in hot oven (450deg.) F. on a greased baking sheet for about twelve minutes.

ECONOMY CAKE.

Raisins, ½ lb; butter and lard, mixed, 1½ tablespoons; brown sugar, 1 cup; salt and cinnamon, mixed, 1½ teaspoons; cold water, 1 cup. Boil together 15 minutes. Let cool and add 1½ cups flour sifted with ½ teaspoon soda. Bake in a moderate oven 30 to 40 minutes.

GINGERBREAD (1).

Golden syrup, 1 cup; sour milk, 1 cup; butter or lard, ¼ cup; flour, 2 1-3 cups; soda, 1½ teaspoons; ginger, 1 teaspoon; salt, ½ teaspoon. Mix dry ingredients together and add the golden syrup and sour milk. Melt the butter or lard, and add it at the end. Bake in a moderate oven 40 to 45 minutes.

GINGERBREAD (2).

Butter, ¼ lb; sugar, ¾ cup; sour milk, 1 cup; soda, 2 teaspoons; treacle or golden syrup, ¾ cup; flour, 2½ cups; gin-

ger, 2 teaspoons; spice, 1 teaspoon; sultanas or preserved ginger, as desired. Put butter, milk, sugar, syrup or treacle, and soda to heat till melted and frothy; then add the sifted flour, ginger, and spice. Sultanas or preserved ginger may be added if desired. Bake one hour in moderate oven.

RICH CHOCOLATE CAKE.

Shortening, 1 cup; brown sugar, 2 cups; egg yolks, 2; chocolate, 1½ oz; flour, 3 cups; soda, 1 teaspoon; salt, ¼ teaspoon; sour milk, 1 cup; walnuts, 1 cup; egg whites, 2. Cream the shortening and gradually add the brown sugar, the well-beaten yolks and the melted chocolate. Mix and sift the dry ingredients and add alternately with the beaten sour milk to the first mixture. Stir in the broken meats. Cut and fold in the stiffly-beaten egg whites and bake in greased muffin tins in a moderate oven (380deg. F.) for thirty minutes. Decorate with caramel or chocolate frosting.

CARROT PLUM PUDDING.

Raw grated carrot, 1 cup; raw grated potato, 1 cup; flour 1 cup; sugar, 1 cup; melted dripping, ½ cup; fruit (mixed), 1½ cups; soda, 1 teaspoon; nutmeg, 1 teaspoon; cinnamon, 1 teaspoon. Prepare and grate vegetables. Measure and mix all dry ingredients. Add fruit and vegetables and lastly melted dripping. Steam four hours in a greased mould. Serve with lemon sauce.

STEAMED PUDDING.

Four, 1 pint; soda, ½ teaspoon; salt, ½ teaspoon; mixed spices, ¼ teaspoon; butter or lard, 2 tablespoons; golden syrup, ½ cup; sour milk, ½ cup; currants and raisins or chopped figs and nuts, ½ to 1 cup. Mix and sift the dry ingredients. Dredge the fruit with a little, then combine all evenly. Mix the beaten sour milk and golden syrup, and add gradually to first mixture. Last of all add the fat, melted. Fill into greased individual moulds and steam fifty minutes, or about two hours in family size mould.

HEALTH NOTES—continued from page 235

Rest Is Important

Not only is physical rest—that is, rest of the body—necessary for these children, but rest of the brain is equally important, and when they recover they must avoid all excitement or overwork at school. All rheumatic children should have ample rest at night, and it is wise to nurse a child in bed whenever he shows active rheumatism or chorea.

It is a mistake to think that a rheumatic child needs to be nursed in a very warm room. A well-ventilated room is far better for the child when awake and asleep. Nothing is gained—in fact, only harm is done—if the patient is kept in a hot, stuffy room. A simple nutritious diet is advocated, milk being of especial value.

Robert Hutchison, an eminent medical authority, considers that many diseases could be prevented, and among them rheumatism, by greater attention to the state of children's throats. The throat should be kept healthy, and if the tonsils are much enlarged or infected, medical advice should be sought.

It can be laid down that a child suffering from an attack of rheumatic fever should be confined to bed for at least six weeks, and should be under strict medical supervision for some

months. Convalescence must be intelligently watched to avoid overstrain. Regular rest periods, fresh air and sunlight are essential. A periodic health examination by the family doctor or the school medical officer is a valuable safeguard against recurrence of the disease.

Recuperative Power

The recuperative power of children against disease is a continual source of encouragement to those who work among them, and the very fact that children with early rheumatic disease are in many cases capable of completely overcoming their affliction should stimulate every effort to help them in their struggle towards recovery. It is this wonderful response of children to intelligent care and treatment that is such an inspiration to nurses and doctors and those helping in children's health camps established throughout New Zealand.

Rheumatism in early life is often the parent of heart disease in later life. It is a common and serious disease in childhood, and its prevention, early detection, and treatment are of vital importance in the interests of the future of the growing child.

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